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Trade in South America.

THE members of the British Economic Mission are now on their way back from South America, having left by the M.V. *Asturias* last week for Southampton. Lord D'Abernon "confesses," says *The Times*, that he is much impressed by the possibilities of Brazil, a confession which thousands of British traders have expressed for a score of years. Further back than that and all the while since, our foreign trade travellers have had no hesitation about the matter and have said so in the ELECTRICAL REVIEW and other trade journals. It has become quite wearisome to hear many such things and to read them in official reports. Everybody seems to know that there are great opportunities in the whole of Latin-America, but they are wonderfully encouraged to hear their views repeated by an official authority sent to spy out the land. Lord D'Abernon, studying the position as it is to-day, says that fidelity to a fixed standard of currency is the only path of wisdom and safety. Of course the Mission had a delightfully warm reception everywhere—we should have been surprised if it had not been so, even after the activities of Mr. H. Hoover last year. The Mission's report will be awaited with interest because the members are reported by *The Times* to be returning home "with every confidence that benefit will accrue to Anglo-Brazilian trade."

It is gratifying to read in a dispatch that one outcome of the tour was the conclusion of a provisional trading agreement with Argentina, the principal object of which is to provide that during the next two years the Argentine Government shall take approximately £8,000,000 worth of British manufactures for railways and other public works in return for the purchase, through trade channels, of Argentine food products to a similar value.

It will be quite useful to learn what the British Mission has to say concerning the effect of American activities in Latin-America. In this connection we may quote from an important communication dealing with this subject, which appeared in the *Frankfurter Zeitung* (July 28th), from a New York correspondent. The writer says that the object of the financial penetration of New York companies is to obtain an active management in Latin-American undertakings, high prices being paid to get control over them according to valuation of the future possibilities of development. It will be remembered that during and before the war the word "pene-

tration " as used against German foreign traders was uttered with a shudder as though relating to an abomination, and all sorts of stories hung around it here and in most pro-British papers and amongst most observers. It is viewed more or less with equanimity with regard to Germany now, but seemingly even less wrath is generated by reference to American penetration—it is almost entertaining to some, while others speculate where it will end and what the consequences will be. The *Frankfurter Zeitung* report says that the policy of American expansion in Latin-America is naturally greatly facilitated by the extraordinary wealth of the United States and the good credit which is enjoyed by the great American electrical concerns at the back of the holding companies which are pressing forward in Latin-America. In particular, attention is directed to the largest holding company of South American electrical securities—the American & Foreign Power Co. This company, which in its turn is controlled by the Electric Bond & Share Co., closely associated with the American General Electric Co., has now after five years' activity become an important factor in American economic life. Having started with the Cuban Electric Co., the American and Foreign Power Co. is credited with controlling on September 30th, 1928, 7,800,000 ordinary shares and 850,000 preference shares in some 38 electricity supply undertakings in South America, while further acquisitions have been made in the meantime. The latter include the share control in the Argentine properties of the Atlas Light & Power Co., Ltd., and of Mexican companies taken over from the Northern Mexico Power and Development Co., Ltd. Similarly active in Latin-America is the International Telephone and Telegraph Corporation.

It is not only in the financial direction, the correspondent says, that the Americans are very active, but also in the matter of advertising. The practice is to erect imposing buildings and arrange showrooms and demonstrations in order to attract customers for electrical apparatus. In this connection it is mentioned that the United States' exports of electrical appliances in common use, excepting telephone apparatus, are greater than ever before and were valued at $110,000,000 last year, of which the greater part was sent to Latin-America.

The above comments still further excite our impatience to know what our own Commission will say.

The Operation of the Grid.

The Central Electricity Board, in carrying out a difficult task has, we think, shown its wisdom in taking the electrical public into its confidence at every opportunity. Mr. A. Page set the standard in his presidential address to the Institution of Electrical Engineers in 1927, and, as a result of experience gained in the Central Scotland Scheme, Messrs. Johnstone Wright and C. W. Marshall gave a very frank exposition of the constructional features in their paper before the Institution last winter. In May last the occasion of the first annual report of the Board was used to give an interesting summary of technical progress, and this has been followed by two further important papers, one by Mr. J. R. Beard before the E.H.P. Conference in Paris, the other by Mr. C. H. Merz before the British Association at Johannesburg. We give elsewhere in this issue some extracts from the widely ranging paper by Mr. Beard, which has been previously referred to in the report of the E.H.P. Conference which appeared in the Electrical Review of July 12th, p. 65. The extracts include a disquisition on protective gear, and we think it should be emphasised that we are in this country as much ahead in this, under conditions of overhead line transmission, as we were in the past when relatively short lengths of cable only had to be considered.

Another item dealt with in the paper that will be of more than academic interest to supply engineers is the elaborate provision for metering energy necessitated by statutory regulations. In many cases the problems presented to the meter manufacturers have been extremely difficult of solution, but it is clear that they have risen to the occasion.

One more point of importance may be touched on—and herein, perhaps, lies our moral. The Board has decided not to put down its own telephone lines, but to rely on the Post Office system. It could, no doubt, have made out a case for the former course on the ground that so large and important an undertaking should be self-contained. This is the argument so often advanced by large industrial works in favour of retaining generating plant, when a supply at the same, or even lower, cost could be obtained from the public mains. The Board, in deciding against isolation, has set an example to the industry of the wider outlook.

Electricity for the Home.

Recent enterprise at Barnes, to which we refer in our second " Electricity for the Home " section in this issue, has, in particular, brought out two points of special interest. One is the practicability of thermal off-load storage schemes with really low charges, and the other is that the all-electric (one coal fire) house can be a proposition acceptable to both the supply undertaking and the small householder.

Admitted that the Barnes undertaking is favourably placed as regards service to a middle-class residential district, we do not think that that counters the business acumen that has resulted in the specially advantageous terms to the consumers.

It has been shown repeatedly in our columns that 0.33d. per kWh (off-peak) can be made a commercial proposition to the progressive undertaking, and when it is realised that the scheme provides the householder with 20 gal. of water per day at 180 deg. F. for a very reasonable expenditure, there is every reason why " three units a penny " should become a popular cry.

The cost figures given for the all-electric (one coal fire) houses will prove of special use and dispel many doubts. Even with coal as an extra, £25 for all services cannot be described as excessive. How many small householders can limit their total coal, gas and electric light bills to 10s. per week? The average cost figure shown for the all-electric houses of £9 14s. is one that might easily turn the scales in favour of electricity.

Reliable information as to the actual costs in respect of all-electric houses is scarce, and we welcome the co-operation of our readers in this matter at all times.

The Effect of the Towers.

On Friday last *The Times* contained pictures purporting to show " the effect of the Towers " by representing a 132-kV transmission line against the background of the country side at Offham. If the grid towers and lines could look as the artist has depicted them, we must confess our own views would be different from what they are. The legend under these illustrations informs us that the spacing proposed was 300 yards, in which case the height of the towers must be many times the 80 ft. stated, while their breadth is similarly exaggerated. The conductors which, actually, slightly exceed three-quarters of an inch in diameter, are almost as clearly visible at a mile and a half away as they are for the first span from the point of observation, where it would appear that their size should be measured in feet rather than in inches.

It may be that this result is due not so much to the artist's ignorance of perspective and proportion as to his membership of a school that has a contempt for realism; if so, he should not have been commissioned to illustrate a material problem.

It is clearly stated in the description text that " the pictures have been prepared by the opposing authorities "; but, unfortunately, many people seeing them in *The Times* may be disposed to regard them as having some relation to truth. We believe the route selected by the Central Electricity Board to be essential to the scheme and can only hope that the public will not be misled by so gross a distortion of the situation.

Electricity as Applied to Farming.

Some of the applications of e ectric power to agricultural operations, its advantages, and comparative cost.

By M. I. WILLIAMS-ELLIS, A.M.I.M.E., A.M.I.E.E., A.M.I.Mech.E., M.S.A.I.E.

VERY little attention has been paid to this subject in this country, as compared with the attention given to it in many other countries. During the past ten or fifteen years the cost of agricultural production, like most other industries, has increased considerably, while at the same time, due to severe competition, the price of farm products has not advanced in the same proportion. Consequently, it would appear that the necessity of decreasing the cost of general agricultural production is of predominant importance.

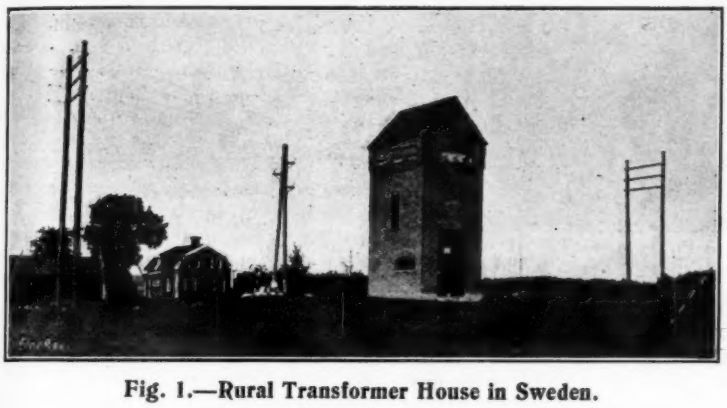


Fig. 1.—Rural Transformer House in Sweden.

Manual labour, so far as is possible, must be replaced by labour-saving mechanical devices. Although it is a mistake to imagine that mechanical, or electrical, machinery will cause all ills in the agricultural industry to be cured, still such machinery is going to be an important factor in its ultimate salvation. In this country about 500 farmers are using electricity in one way or another, while in Sweden upwards of 52,000 farmers use it.

Private individuals in this country have done a great deal in exploring the possibilities of the full application of electricity to farming, and it may well be stated that Mr. R. Borlase Matthews has championed the cause for its application more than anyone else, in the fact that he has carried out more research work in this direction and applied electricity in a practical way to farming. He has certainly practised what he has preached, and no better example of the application of electricity to farming can be given than that on his farm at East Grinstead. The Institution of Electrical Engineers has furthered this branch of engineering to a great extent by its report of 1925, while its special committee has done further excellent work in this direction. In this country the application of electricity to farming has been slow for many reasons, and one may consider the chief reasons to be the following:—

(1) Centralisation of industries.
(2) Absence of distribution schemes.
(3) High cost of supply.
(4) General lack of interest in rural reconstruction.

Under the banner of "back to the land" something further may be done for the electrification of our rural industries, but that alone will not be enough; one must have the co-operation of the experts, the engineer, farmer, manufacturer, and distribution companies with the outside support of the Government and local authorities, the latter in a practical and non-political way, together with the avoidance of all "red tape."

The uses to which electricity can be applied to agriculture are many, and under each heading careful consideration is necessary; the main headings are as under:—

(1) *Motive power*, for electric ploughing gear and driving general farm machinery, such as chaff-cutters, grinders, pumps, threshing machines, dairy plant; shearing, sawing, crushing, root pulpers, hay and crop elevators, milking plant, crop dryers, &c.

(2) *Lighting*, for house, farm buildings, and poultry houses.

(3) *Heating*, for cooking, hot water supply, laundry work, sterilisers, and incubators, &c.

(4) *Stimulation of crops by electro-culture*, under which come the treatment of seeds and treatment of plants by intensive illumination.

There is little doubt that in the near future greater strides will be made in the application of electricity to farming under the above headings, and will become more and more generally applied, as it has in other industries; and will be the means of reducing costs and increasing the output of our agricultural industry generally.

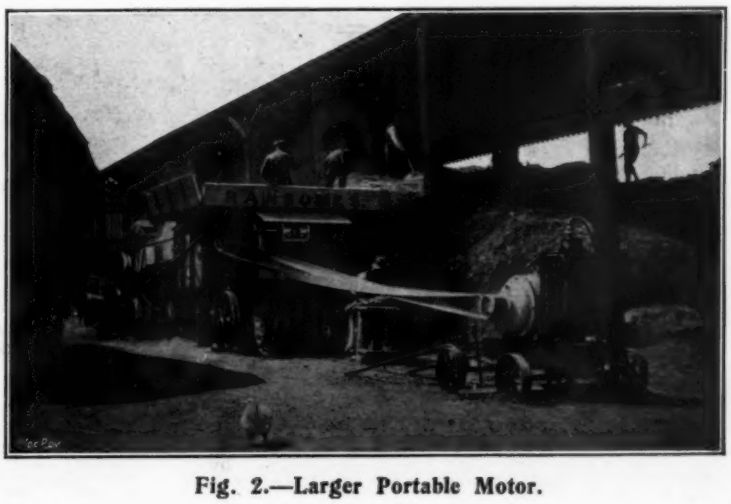


Fig. 2.—Larger Portable Motor.

One of the first essentials in the direction of stimu-

lating electrical farming is cheap electricity and a well planned distribution scheme, assuming that in the latter case farms are not equipped with their own electrical generating plant.

The financial aspect in this direction rests with the generating station and distribution company engineers, while there are many points in connection with electrical farming that may well be catered for, with advantage to all. It is true that in some districts such engineers are doing much, but greater energy is required in most cases, even to the education of the farmer in the use and application of electrical machinery.

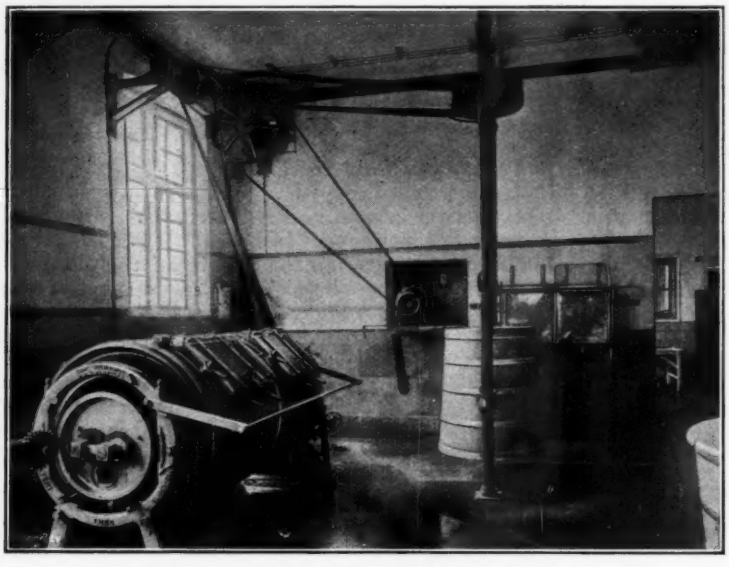


Fig. 3.—An Electrically-driven Dairy.

From the station engineer's point of view, load factor is one of the chief points with which he is concerned, and it is interesting to note that in this direction figures are given of from 13 per cent, up to as high as 55 per cent. in connection with the use of electricity on different classes of farms, which in itself is far more satisfactory than an engineering works with a load factor of 17 per cent. approximately.

The data obtained from countries where great strides have been made in rural districts in connection with the application of electricity to farming are indeed interesting reading; the chief countries concerned being America, Canada, New Zealand, Australia, Japan, Sweden, France, Germany, and Italy. It would appear that a good supply of electricity in rural districts would not only be of benefit to the farmer directly, but also indirectly, as it would stimulate local industries and would act as a checking force to the deplorable migration from country to town, and be a means of affording an economical opportunity of paying wages to the country worker that are comparable to the town industrialist.

Fig. 1 shows a rural district transformer house in Sweden for agricultural work.

Design of Electrical Machines for Farm use.—

It is under this heading that manufacturers can do a great deal in the matter of designing machines for actual farm use, the essentials being ruggedness in conjunction with simplicity and low first cost, which applies equally to the electrical and mechanical portions of plant, as the farmer has little or no time to spend on repairs and overhauls.

Electric motors on a three-phase system are usually of the squirrel-cage type, as it has many advantages, the chief of which are simplicity, mechanical and electrical strength, while other attractive features are low first cost and little maintenance. The chief disadvantage is, of course, small starting torque, but as farm machinery is generally started under light load, such motors are eminently suitable for such work, wound-rotor motors being used where they have to start against full load. For a d.c. supply shunt motors are usually adopted.

In all cases the machines are totally-enclosed, drip-proof, or enclosed ventilated, as dust, dirt, and moisture have all to be guarded against in connection with agricultural work, not to mention the acid and ammonia fumes that have to be contended with when manure is present. It is for these reasons that all windings should be very carefully vacuum impregnated. The lubrication should be simple, fool-proof, and allow for motors to work at different angles, ball bearings giving the best results.

The switch gear should be simple, fool-proof, of robust design, and mounted in an iron watertight case, while it is often advantageous to have the actual starting gear embodied in the frame of the motor. The size of motors may vary from ¼ b.h.p. for such work as cream separators, shearing apparatus, churns, and the like, up to 60 or 120 b.h.p. for ploughing. The more or less standard sizes in general use may be taken as ¼, ½, 1, 2, 3, 5, 10, 15, and for ploughing up to about 80 b.h.p. Small motors of a portable type have been a good deal used, while for these special gearing is often installed to give very low speeds when required in connection with different class of plant to be driven. Such a motor is shown in fig. 5 as supplied by Messrs. Ransomes. The motor has three driving shafts running at different speeds, and two different special pulleys are provided, so that nine different speeds are obtained without changing the pulley on the driven machine.

Another type of portable machine of standard design and of greater output by the same maker for such work as threshing is shown in fig. 2. The B.T.H. Co. has designed a special range of motors for farmers' use, and one of its neat portable sets is shown in fig. 7; the motor is rated at 5 b.h.p., 400/440 volts, three-phase, 50 cycles, fitted with a 5½-inch pulley, and provided with 40 ft. of 3-core c.t.s. cable with an earth core. Generally most farmers, when first installing electricity, pre-

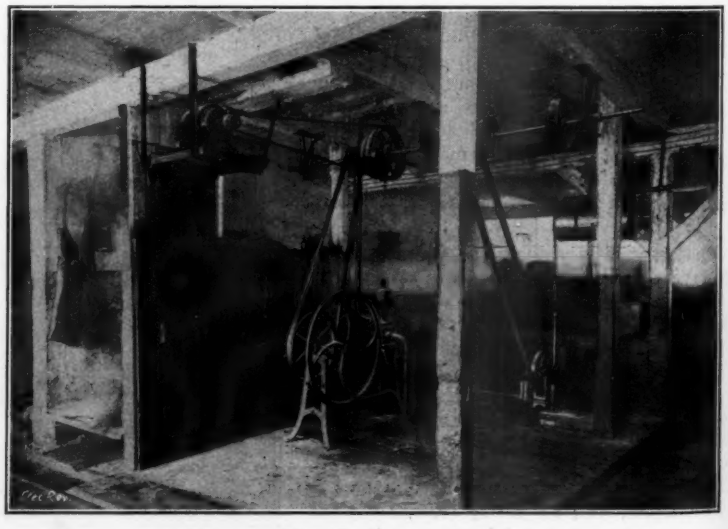


Fig. 4.—Electric Dairy Air Pump.

fer a portable motor, so as to be able to use it on a number of different machines with as small a capital outlay as possible; after a short time they so fully appreciate its value that they gradually, as finance permits, install individual motors for each machine, or group of machines. Fig. 8 shows a B.T.H. unit drive for an oats crushing machine, by a 7½ b.h.p., 950 r.p.m., 400/440 volts, ventilated, squirrel-cage type motor.

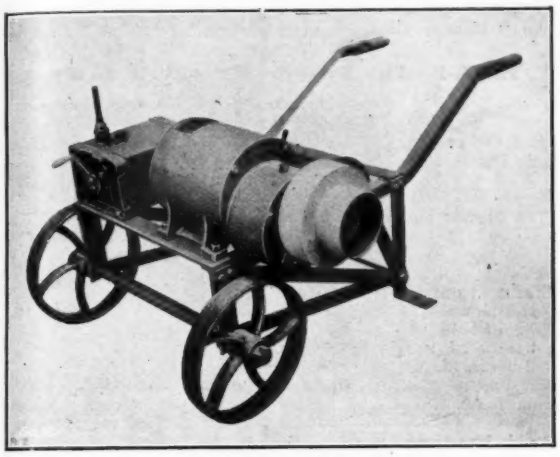


Fig. 5.—Small Portable Motor.

The main power supply is now always alternating, three-phase, generally at high voltages. It can easily be transformed to the voltage required for farm distribution and for driving motors. When power is taken from the supply authority's mains in this way, it is probable that the junction point will have to be at one place, even if the mains pass right across the estate. Where power is taken off, a small sub-station will have to be fitted up, including a transformer, &c. In connection with ploughing and the like, a portable sub-station is often employed in connection with a "flying" line, and a common practice on the Continent is to make connection with, say, a 30,000-volt line by the simple method of hanging hooks direct on to the line. The more fool-proof and safer method, however, also employed, is to use pole contacts as shown in figs. 10 and 11 which are operated from the ground as shown.

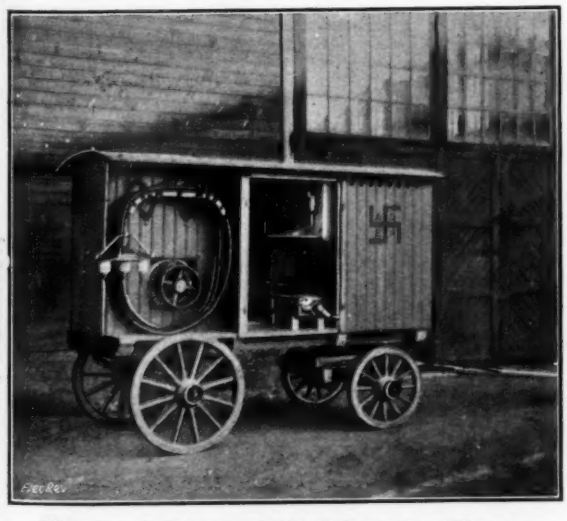


Fig. 6.—A Transportable Sub-station Wagon.

Fig. 9 shows a farm transformer of 5 kVA capacity, 3,000/400 volts, mounted on wooden poles for supplying the small units.

Fig. 6 shows a portable sub-station supplied by the Asea Electric Co., Ltd., mounted on a wagon with motor, h.p. connections, transformer, and switchgear.

Cables and wiring.—For overhead lines the best system is bare copper, tappings being taken off for the different buildings and led in through the walls through porcelain tubes. The wiring inside the buildings should be a first-class steel-tube system, which is admittedly the most expensive system; the tubes should also be coated with impregnated hemp so as to resist the action of the moisture and acid fumes, &c. Plain lead-covered wiring is not often recommended, except in very dry places. A system used abroad, which gives excellent results, is to run the bare-copper wiring along inside under the roofs, mounted on porcelain insulators; this system is the cheapest and less likely to give trouble than any other from an insulation point of view, as one must always bear in mind that in stables and the like one has not only to contend with moisture, but also the deleterious effects arising from ammonia and acid fumes, so that ordinary house wiring is of no use in such cases. The writer has found that a good class of c.t.s. or "Maconite" cable, when placed on insulators, has given excellent results for the above work.

Fig. 3 shows an electrically-driven dairy and the method of wiring, while fig. 4 shows an electric motor driving an air pump for milking machines and water pump.

For connecting up motors, &c., and for trailing cables, c.t.s. cables provided with an earth core give excellent results.

Switches for internal work are best of the overhead type, operated by turning handles, or the inverted rotary type with drip protecting porcelain shield, the latter being used in preference to the tumbler type switch.

Lampholders should be of porcelain, or the all composition type, preference being given to the screw type lampholder and lamp for specific reasons.

Consumption.—An approximate estimate of the energy that would be consumed on a farm of about 150 acres is as follows:—

Lighting house	120	kWh per annum
Lighting buildings	150	" " "
Motive power...	1,500	" " "
Heating and cooking	1,600	" " "
Total	3,370	

Fig. 7.—Transportable Electric Motor.

In a special report of the I.E.E. it is interesting to note that the consumption per acre of 33 farms in a certain supply area is given as 9.5 kWh, but statistics of use on Continental farms which have used electricity for several years, show a higher consumption than this, averaging 22 kWh per acre, while in the North-East of Germany the consumption may average (without electric ploughing) as high as 100 kWh per acre.

The outputs indicated in Tables I and II are based on those obtained when the electric motor is working at full load, but there are times when the motor is not required to work at full load. On those occasions, an electric motor is very much more economical than any type of oil engine, as it only consumes electricity directly in proportion to the work it is doing, while an

Fig. 8.—Oats Crushing Machine.

oil engine consumes practically the same amount of fuel whether it is running at full load or running light. If either a 2- or 5-b.h.p. electric motor is operated continuously at full load, it will consume nearly two or five kW per hour, respectively. The electric motor, however, unlike nearly all other sources of power, is very sensitive to any reduction in load, so that the consumption per hour in practice averages out at just over a third of a kWh per horse power (much depending on the nature of load), *i.e.*, just over two-thirds of a kWh for a 2-b.h.p. motor and one and two-thirds of a kWh for a 5-b.h.p. motor.

TABLE I.—Two Horse-power Agricultural Motor.

Machine.	Speed of machine per minute.	Approximate capacity of machine per hour.
Chaff Cutter ...	200	12 cwt. ¾ in. chaff.
Grinding Mill .	550	4 Bushels soft meal. 6 „ medium meal.
Corn Crusher	150	16 Bushels Oats. 26 „ Beans, Peas, or Maize. 40 „ Malt.
Cake Breaker ...	100	28 cwt.
Root Pulper ...	80	2½ tons.
Root Grater ...	180	4½ tons.
Kibbling Mill ...	550	15 Bushels.
Milking Machine	—	Milk 100 cows (6 cow plant).
Saw Bench ...	1,000/1,300	6½ in. depth of cut.
Pumps	1,400	2,000 gallons per hour, total head 100 feet.
Ball-bearing, non-finishing thrashing machine ...	—	40 Bushels Oats.

Most electricity supply authorities supply energy for power purposes at a price of 3d. or 4d. per kWh, or less, so that, assuming electricity can be obtained at 3d. per kWh and taking the figures for average consumption stated, the cost of running the 2-b.h.p. motor for one hour will be approximately 2d., and the 5-b.h.p. motor 5d. These figures indicate that a considerable saving can be made by substituting electric power for both man and animal power.

Electric Ploughing.—Under this heading very little has been done in this country when compared with what has been done in other countries, although it is the most important load on a farm from the point of view of the power supply engineer. A well-known system is that of Messrs. Fowler, of which a description will not be out of place. The system is known as the "Fowler electric cable ploughing tackle." As the

TABLE II.—Five Horse-power Agricultural Motor.

Machine.	Speed of machine per minute.	Approximate capacity of machine per hour.
Chaff Cutter ...	200	38 cwt. ¾ in. Chaff.
Grinding Mill ...	500	10 Bushels.
Corn Crusher ...	200	20 Bushels Oats. 50 „ Malt. 20 „ Linseed. 30 „ Beans, Peas, or Maize.
Kibbling Mill ...	500	25 Bushels.
Ensilage cutter and blower ...	700	8 tons.
Cake and biscuit breakers and Pulverisers ...	450	12 cwt.
Saw bench ...	800/1,000	10 in. depth of cut.
Pumps	1,400	4,000 gallons, to al head of 150 feet.
Ball-bearing, finishing thrashing machine 6 ft. drum	—	45 Bushels.

available power in the great majority of cases will be alternating current, provision is made for a transformer to be carried on the back of the engine. This arrangement at once simplifies the installation, because

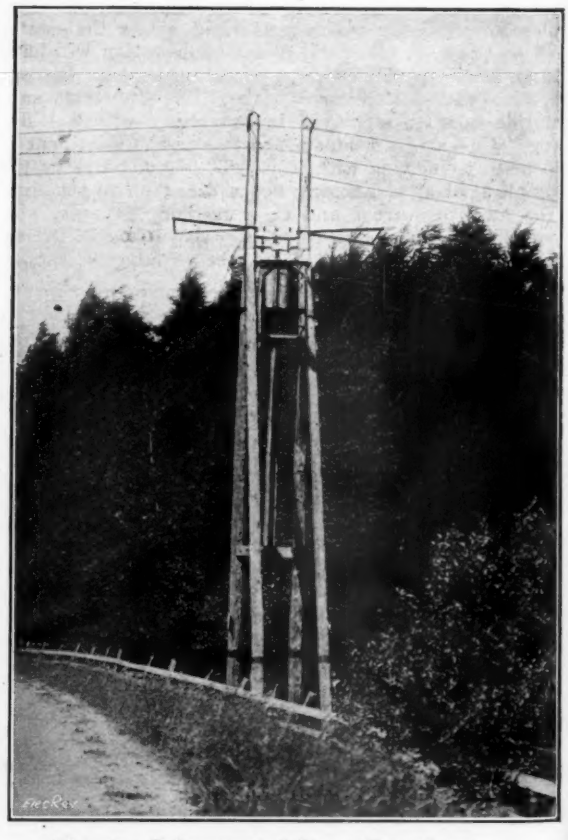
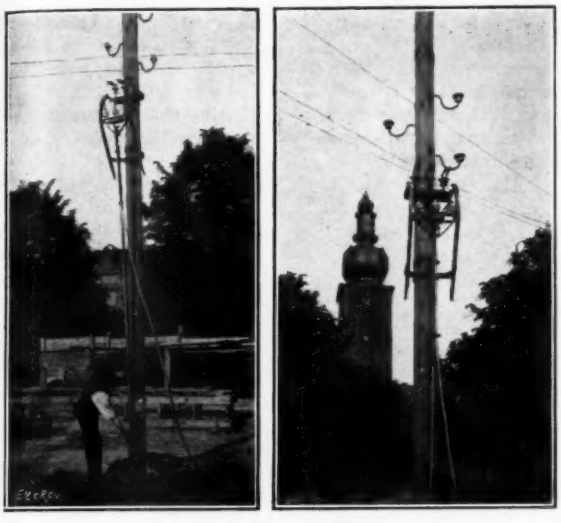


Fig. 9.—Pole-mounted Farm Transformer.

the power can be brought through the overhead wiring and flexible cable at an economical voltage, of, say, 2,000-3,000 volts and transformed down on the engine itself to a suitable working voltage for the motor, which eliminates any danger to the driver, and also enables standard motors to be used. In addition to the electric driving motor, which is of the slip-ring induction type,

a 4-cylinder engine of small power is fitted for moving the plant about from place to place when not coupled to the electric power. Both electric motor and petrol engine drive the same gearing and are arranged to operate either the ploughing gear or the road gear. Two running speeds can be arranged on the motor by



Figs. 10 and 11.—Pole-line Tapping Contacts.

alteration of the number of poles, and two sets of bevel gear can also be fitted for ploughing, giving a range of four different speeds to suit varying loads and soils. In general, the Fowler electric hauling engine is similar in design to the Fowler steam and motor-ploughing engines, with a horizontal drum carried underneath the frame for carrying 450 to 600 yards of rope. The frame is of deep steel plates strongly reinforced to carry the shafts and gearing, and also to house the electric motor and petrol engine. All controls are brought back to the driver's footplate at the rear of the vehicle. The flexible cable is carried on the drum at the rear of the hauling engine, fitted with hand winding gear for coiling it up again after it is paid out.

Relative Costs and Comparative Economy.—In comparing the working costs of steam, motor, and electric cable tackles, the difficulty is at once experienced that electrical ploughing requires considerable outlay on permanent equipment, the cost of which varies in each individual case. Electrical ploughing machinery, implements, and hauling engines, with their flexible cables, will cost approximately the same as a set of internal combustion tackle, and perhaps 10 or 15 per cent. more than a similar set of steam tackle. To this must be added the cost of the overhead wiring, which one can estimate roughly at 10s. per acre for a regular and freshly laid out estate, and also the cost of the main sub-station, transformer, switches, &c. The actual running costs comparison is simple: for English ploughing in medium soil about 20 kWh of electricity, or 100 lb. of good coal, or 2¼ gallons of petrol, are required per acre. In addition to the cost of coal, about 1s. per acre must be added for the cost of hauling water and 5s. per ton for hauling the coal; ½d. per gallon may also be estimated as the cost of delivering petrol or other engine fuel.

On this basis it is easy to compare the running cost of ploughing or cultivating by the various systems. In addition, however, the extra initial cost of installing the electrical power has to be considered in any particular case, except in instances in which it is carried out by an electric power company and included in its charge for power.

New Switchgear.

Some notes on a fully automatic Crompton Parkinson oil circuit breaker without current transformers or series trip coils.

A NEW oil circuit breaker developed by Crompton Parkinson, Ltd., and named the Crompton "T.A.P." breaker, possesses features which seem to be quite new in oil circuit-breaker design and, it is claimed, offer important advantages. Briefly, it consists of a breaker of normal design, which is tripped by the fusing of any one of the three fuses which are carried under the moving crossbars of insulating material. On an overload or fault the circuit is interrupted by the fuse, and the complete disconnection of all phases at the switch contacts follows instantly. The advantages claimed for the innovation are:—

The break is quicker than that of any ordinary circuit breaker operated by current transformers and the usual tripping mechanism.

The fault, or overload, current is interrupted by a fuse, followed by two further breaks in series at the switch contacts, thus providing three breaks in series per phase. The fault current is always interrupted by the fuse. The amount of metal fused is limited, and damage to switch contacts is avoided.

No current transformers are required, and therefore the "T.A.P." breaker can be used on small-capacity circuits supplied by trunk lines, where current transformers of low primary rating would have insufficient mechanical strength, or thermal capacity, for safe use. The fuse can be set to operate with reliability at as low a current as 2½ amperes.

The switch portion follows conventional oil circuit-breaker design and has a high rupturing capacity. The switch contacts are protected from severe fault conditions, however, by the fuses, which introduce an additional and exceptionally rapid break. As a result, the rupturing capacity is higher than that of an ordinary oil circuit breaker of similar size, the standard unit being rated nominally at 75,000 kVA, but that figure,

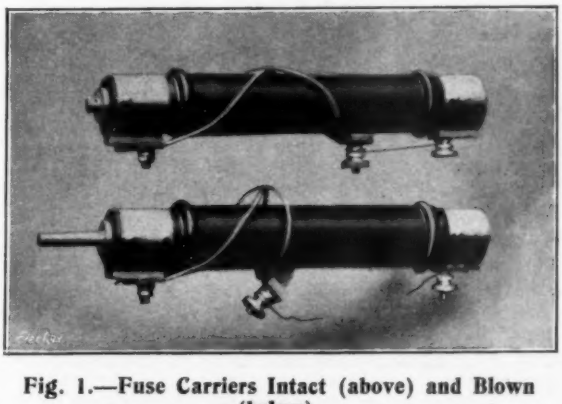


Fig. 1.—Fuse Carriers Intact (above) and Blown (below).

it is believed, does not represent the limit of its capabilities.

The new breaker must not be confused with switch-fuses, or similar fuse devices, which may open on individual phases and leave a three-phase system connected to two lines only. When one fuse blows the three phases

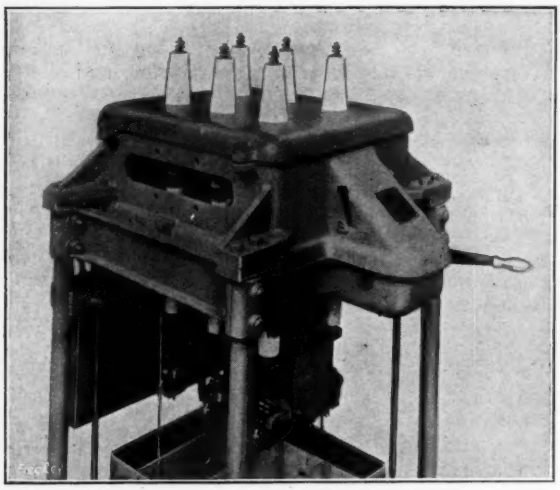


Fig. 2.—Cover Removed, showing Isolating Plug Contacts.

are tripped instantly, and the breaker cannot be re-closed until the blown fuse has been renewed.

A drop-down isolating device is incorporated, which by a continuation of the normal opening movement completely isolates the switch portion and the fuses, and the breaker cannot be closed unless all fuses are sound and the tank is on. This feature permits the replacement of fuses with complete absence of danger to the operator, and removes any possible objection to the use of a trip-

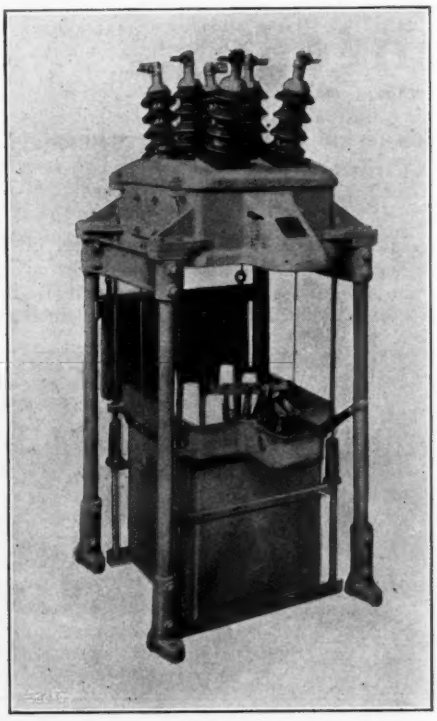


Fig. 3.—Breaker with Switch Lowered.

ping device which is normally at line voltage. It is, of course, clear that the operating bar, which is actuated by the fuse and causes the trip mechanism to operate, is made of high-grade insulation material.

The general construction of the " T.A.P." breaker is shown in the accompanying illustrations. The automatic feature is obtained by means of a spring-loaded fuse, the fuse wire holding a spring in tension while intact and releasing it when melted, the plunger operated by the spring then actuating the tripping mechanism. A patented lever device is incorporated in the fuse unit which relieves the fuse wire of almost all strain and enables a strong spring to be kept extended with a pull just sufficient to keep the fuse wire taut. This device enables fine fuse wires to be used with a spring strong enough to ensure positive tripping. The fuse wire itself consists of a special alloy, which has high tensile strength and does not alter its fusing characteristics even when heated repeatedly to nearly fusing point, cooled, and heated again.

The isolating device is of the drop-down type with interlocks, as mentioned above. In the action of closing the breaker the isolating contacts, which are attached at their lower end to the upper of two crossbars, engage in sockets mounted in insulators in the terminal plate above the switch top. Continued movement of the closing mechanism compresses a spring between the two crossbars and closes the switch contacts; this spring acts as an accelerating spring to ensure a rapid break on opening. Continued movement of the operating

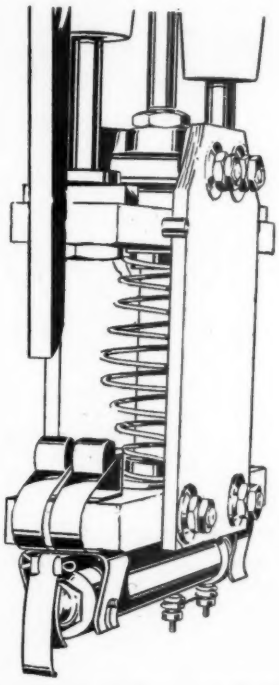


Fig. 4.—Detail View of Fuse and Switch Contacts.

mechanism after the switch has been opened isolates the complete unit. Means are provided to facilitate the lowering of the oil tank for inspection and replacement of fuses; also the complete switch may be removed by the same means to facilitate the making of cable joints and connections, or to enable the complete switch unit to be taken away for inspection.

The Crompton " T.A.P." breaker is considered by its makers to be eminently suitable for use in situations where time limit overload protection is required, such as for transformer or radial feeder control and for consumers' circuits. It is rated at 100 amps., 11,000 volts; can be set to operate at 2½ amps.; and has a high rupturing capacity. Although robust and substantial, its simple design ensures a low manufacturing cost.

Various terminal arrangements are available for indoor and outdoor service, and the breaker can be arranged for pole mounting with an operating lever at the foot of the pole. A pattern has also been standardised to enable the unit to be mounted direct on the h.p. side of a power transformer. The breaker is now in production and additional sizes are being developed for higher and lower voltages, using the general principles described above.

Financing Hire-Purchase Systems.

It is possible for a firm selling goods on the hire-purchase system to use the system as a means of securing repeat orders and keeping its customers away from its competitors.

(COMMUNICATED).

HIRE-PURCHASE trading has become so general in the British Isles that almost every industry is affected by it in some way, and its effects are far greater than is commonly supposed. For one thing, it is now practically impossible to judge a man's wealth by his possessions. By depositing a few pounds with a furniture dealer, a man can obtain a house full of furniture. By depositing a few hundred pounds with machinery suppliers, a manufacturer can equip his factory with costly machines. In America almost anything that has a few years' life is purchasable by instalments, and the same can almost be said of England. Homes, furniture, motors, electrical and radio apparatus, musical instruments of all kinds, wearing apparel, &c., can all be bought on the hire-purchase plan, while there is also a tremendous amount of instalment business being done in plant and machinery for manufacturing firms and supplying houses up and down the country.

Modern thought has abolished the old notion that it was "hardly respectable" to buy on hire-purchase terms. "Enjoy while you pay" has become the present-day slogan, and the large stores don't forget to drive this point home in their advertisements. It is simply a form of credit, similar, in a way, to that indulged in from time immemorial with regard to tailors' bills and tradesmen's accounts—a habit which is practised by the best society! But it has this great difference—it is an honest contract: the supplier of the plant, the machinery, or the articles in question is not being cheated of his just dues, and the amount of the credit is being reduced periodically.

No Invoices or Statements.

A trader should never send out an invoice or statement in connection with goods sold under a hire-purchase system, because these documents could be used by the purchaser to give the impression that the goods were his. If, therefore, such documents fell into the hands of a receiver in bankruptcy, they would give him valuable evidence of ownership. It is advisable for a complete specification of the articles supplied to form part of a hire-purchase agreement. If a copy of this agreement is handed to the purchaser at the time of sale, this specification will give sufficient information for any books that the purchaser may keep and an invoice will be unnecessary.

The hire-purchase trader should take care to protect his goods out on hire from loss by fire, or any risks that may apply. He will usually obtain one floating policy covering the whole of his stock in the hands of his customers. Every time goods are sent out on hire the amount of the policy will be increased by their value, and every time a hire-purchase is completed the amount of the policy will be reduced by the value of the goods in which the trader is no longer interested.

Form of Agreement.

If a trader is serving customers who are forced to buy on the instalment system, he will be well advised to incorporate in his agreement conditions that will provide for any contingency, and it will generally be found that the purchasers are not in a position to complain of this. When, however, the retailer is serving customers of higher financial standing, who pay by instalment because it is, to them, the most convenient method, he will have to make his hire-purchase agreement simple and reasonable. In such cases, the agreement should have the appearance of an order form rather than a legal document. It should be printed in an attractive style and on good paper, and the conditions should be set out clearly and in simple language.

In selling goods to this class of customer a trader need not provide for every contingency in preparing his hire-purchase agreement. It is a well known fact that the wealthier classes take more care of their goods and chattels than do the poorer classes, and they will assume greater responsibility in connection with articles bought on hire-purchase terms. It will generally be found that a customer in comfortable circumstances can be relied upon to complete a hire-purchase as soon as possible, and will often do so some time before the end of the period of credit allowed.

Financing the Hire-purchase System.

There is no need for the retailer to worry about financing his hire-purchase business, for there is now a large number of financing houses which are established for the sole purpose of advancing money to traders who do hire-purchase business. These financing houses are usually secured by an assignment of all the trader's rights under the hire-purchase agreement, so that the trader's lien on his goods is really passed over to them. In some cases the financing house advances only a proportion of the amount invested in the hire-purchase system and takes no part in the collection of the instalments, but in other cases the financing house buys the trader's interests in the sales outright, at a discount, and collects the instalments itself.

In this present time of difficulty and monetary stringency, living, as we do, in a highly industrialised world, everybody needs credit; even the big 'bus companies and haulage contractors who need more vehicles may not see their way clear to laying down the full cost in ready money. It is to meet all such cases that these instalment and hire-financing companies undertake to provide the necessary cash against risks that are reduced to a minimum by means of insurance against anything that is likely to happen in an uncertain world—such as damage, theft, fire, or default on the part of the hire-purchaser. When once this load has been lifted from the shoulders of the supplier he is free to extend his operations.

A typical example may be seen in the case of a small fried-fish business, in which a man may not be able to produce a lump sum of, say, £160 for a tiled and nickelled three furnace frier, but he is now able to get such a piece of apparatus by instalments, and its very presence in the shop, whilst it is being paid for, is a sales help.

In the same way a business which calls for distribution is able to get motor vans or lorries, and so widen the circle of its influence while the increased business is paying for the cause of it. Holiday-makers enjoy tours in charabancs that are still being paid for by instalments, just as the private owner pays every month a part of the purchase price of his high-powered car or his bicycle.

Developing a Market.

The disquiet that is expressed in some quarters concerning the growth of instalment purchase is evidence that many are ignorant of these insurance schemes, which are enormously increasing the possibilities of the

use of capital. In many cases sales managers are crying that, if only it were not for the fact that so much of their financial resources was tied up, they could expand their trade, lower their overhead charges, and reduce prices. From the sales department's point of view, the hire-purchase system develops a consistent market for all kinds of commodities that is far above the ordinary cash-down sales system, and, from the purchaser's point of view, it enables him to enjoy the comforts and conveniences of life, for which he would otherwise have to save for a long period.

Here in England the instalment-purchase business is spreading, and a firm, to be up-to-date, should be prepared to accept business on these lines. But, in order to free itself from the restrictive effect that such business would entail, its principals should get into touch with one of the financial houses that specialise in dealing with this form of selling.

Electricity for the Home.

Notes on the progress made in domestic electrification by a municipal electricity supply undertaking serving a middle-class residential district.

Developments at Barnes.

IN contrast with the Hammersmith undertaking, to which we referred last week, the domestic load at Barnes is really "there for the asking," no doubt because the district is almost wholly a middle-class one. The engineer and manager, Mr. C. S. Davidson, M.I.E.E., and his staff are to be congratulated on the manner in which they have grasped the opportunity of domestic business. The business is obtained not so much by propaganda as by low tariffs. There is an all-in tariff in vogue of 7½ per cent. of the ratable value of the premises, plus 1d. per unit for energy consumed from October 1st to March 31st, and ½d. per unit from April 1st to September 30th. Hot-water storage is catered for at 0.33d. per unit, the supply being time-switch controlled to limit it to the night period during the winter months. An interesting article dealing with the water-heating question, from the pen of Mr. Davidson, appeared in our issue of August 16th, p. 273. Existing hot-water tanks in houses equipped for water heating by coal or coke are heat insulated by a suitable mattress, and the tanks are equipped with immersion heaters. There are at present about 50 consumers at Barnes taking supplies for water heating in this manner. The attractiveness of this scheme to the consumer will be appreciated when it is realised that for an expenditure of 3d. per day 20 gal. of water can be obtained at a temperature of 180 deg. F.

Fig. 1.—Exterior of "All-Electric" House.

Out of about 10,000 houses in the Barnes supply area, 8,000 are connected to the undertaking's mains. There are 400 cookers out on hire, and many new consumers have up to 15 kW of electrical domestic apparatus installed. The majority of consumers have installed loadings of 5 kW. There is also a number of workmen's cottages in the area, and the occupants generally are keen to take advantage of the cheap supply afforded by their low assessments. On a large estate of the London County Council in the area, comprising some 650 houses, 57 cottages are wired as all-electric, with the exception of one coal fire in the kitchen. The undertaking is making the "all-electric" proposition a particularly attractive one for these consumers. They are all on the ratable tariff, and the electrical equipment, which includes a cooker, wash boiler, 2-kW radiator, bowl fire, iron and an electric kettle, is hired to each consumer, all for 10s. per quarter. A view in the interior of one of these houses is shown in fig. 2, and one of the exterior in fig. 1. The success of the scheme is indicated by the fact that occupants of the other part of the estate are eager to move to the "all-electric" portion. The maximum consumption for one consumer in the houses was last year 6,480 units, the maximum payment being £25 6s. 7d. The average revenue obtained from the houses was £9 14s. 7d., and the average price obtained per unit was 0.99d., exclusive of hire charges, and 1.25d., inclusive of hire charges. The total energy sold to these houses last year was 106,228 units, 54,812 units being consumed during the two summer quarters.

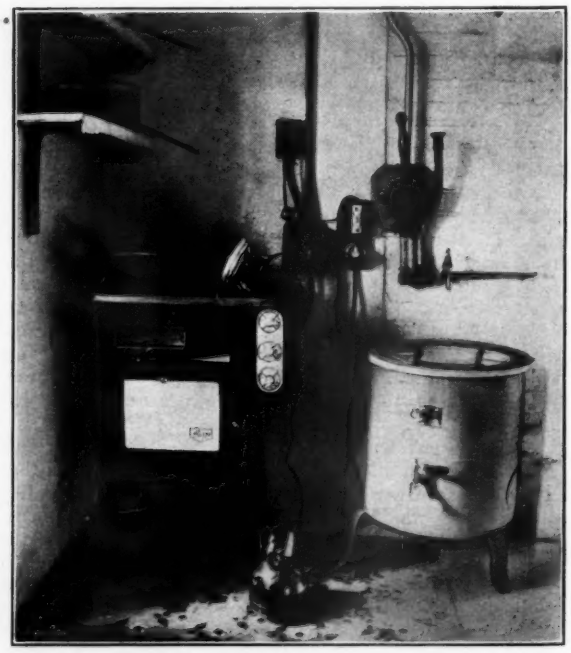


Fig. 2.—View in "All-Electric" House, showing Cooker and Wash-boiler.

A progressive builder in the area has been encouraged by the attractive terms offered by the Department to erect 150 houses, valued at about £1,250 each, all being wired on the " all-electric " principle, except for one coal-fire. An electric cooker is supplied with every house, and most of the purchasers have had installed, in addition, two 3-kW fires and a wash boiler, besides smaller apparatus. Considerable use is made at Barnes of the publication of the Electrical Development Association's entitled " 20th Century Cookery," edited by Mrs. A. Mole, M.C.A. This book has proved popular among consumers.

The hiring rates for cookers at Barnes vary from 3s. 6d. per quarter to 12s. 6d., and with every cooker is supplied an electric kettle. The undertaking does its own repairs and reconditioning, and the maintenance costs as the result have proved very low indeed.

On 285 cookers for last year, the total handling and maintenance costs amounted to about £100. Among a variety of types of cookers which are being hired out by the undertaking, the new No. 1284 " Hotpoint " cooker has proved popular. This cooker, fig. 3, which is among a range of cookers introduced by the makers specially for hiring schemes, is suitable for seven to ten persons. The hob carries two 8-in. square and one 6¼ in. diameter enclosed-type boiling plates, a separate grill, with a door to the grill chambers. The oven is of the one-piece removable type, the corners being rounded for ease in cleaning, the sides of which are fitted with round-wire shelf runners. The boiling plates, grill, and oven are arranged for three-heat control. The loadings are: two square boiling plates, 1,800 W each; circular plate, 1,000 W; grill, 1,750 W; and oven, 3,000 W. The hob is vitreous enamelled mottle grey, as are also the removable oven and the inside door pad. A heat indicator is fitted on the oven door, and the doors of the oven and grill chamber have vitreous enamelled white panels. The switch indicating plate is also white vitreous enamelled with black indicating letters.

The dimensions are: hob, 28¼ in. wide by 22½ in. deep; oven, 16 in. wide by 16 in. deep by 18 in. high (available cooking space); height to hob, 37¼ in.; grill

Fig. 3.—" Hotpoint " Cooker used at Barnes.

space, 10 in. wide by 7 in. deep; and grill chamber and warming cupboard, 17 in. wide by 21 in. deep by 6 in. high. A feature of the revised model of this cooker is that the cut-away portion of the hob is now dispensed with, so that the hob is complete in one piece, and is hinged at the back; it can be easily raised for inspection of the internal wiring, fuses, &c., without the removal of the back skirting and pot rack.

Fig. 4 shows the " Bastian " 1929 water heater, which is now being supplied to the Barnes undertaking, where immersion heaters in existing tanks are not practical. The following are the principal features of this apparatus: thermostatic control; efficient cork lagging; towels and linen can be aired on the lid; immersed heating elements; wall brackets and outlet in base in type " W "; ball valve arranged for either side of heater; nickel-plated fittings; minimum furring due to low-temperature heating design; and easy maintenance. The

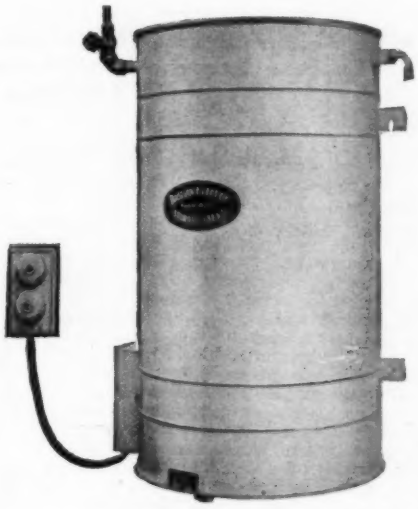


Fig. 4.—" Bastian " Water Heater; 1929 Model.

heating tube on which the sediment settles can be easily unscrewed and cleaned. The loose lid enables easy work and inspection.

The appliances referred to in the foregoing notes are made by, respectively, the Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, Oxford Street, London, W.1, and the Bastian Meter Co., Ltd., Farnham Road, Trading Estate, Slough, Bucks.

Installations in American Houses.

A nation-wide survey on behalf of the Society for Electrical Development in the United States is announced to have been completed. The survey, conducted in 3,203 typical homes in 23 communities, situated in 17 of the United States and also in the Province of Ontario, is stated to be a preliminary to a national campaign to increase the use of electricity in the home. The homes visited were selected to reflect varying buying power, and included all types of residences with from four to fifteen rooms. The objects of the survey were to determine the adequacy with which typical American homes are wired, as gauged by the minimum standard of the Society for Electrical Development; to find the number and nature of electrical appliances in the typical household; to study " consumer interest " and appreciation of the value of electricity; and to determine ways to develop a large market for electricity and electrical apparatus in American homes.

The dining room was found to be nearest to the specifications in the greatest number of cases, the best bedroom meeting minimum requirements in only 43 per cent. of the homes. Except for the living room, nearly half the rooms were found to have no convenience outlets. Most of the homes were reported to be fairly well equipped with ceiling fixtures and wall brackets, but the lack of switches is said to have been marked.

Free Maintenance.

Faith in the electric range is apparent in the Tasmanian Hydro-Electric Department's advertising campaign, which features easy terms of purchase, and free maintenance of ranges for three years!—*Australian Electrical Times.*

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

The G.E.C. and the Ideal Home Exhibition.

One of the outstanding attractions of the 1930 *Daily Mail* Ideal Home Exhibition, which is to be held at Olympia from March 24th to April 17th, will be a "Pavilion of Light" arranged by the General Electric Co., Ltd., in connection with which the company and the *Daily Mail* have organised a competition in which £1,000 will be offered in prizes. The Pavilion will include a suite of six rooms. It is the lighting, decorating and furnishing and equipment of these rooms which will be the basis of the competition. The lounge, dining-room, bedroom, and nursery will be the subjects of one section of the competition for architects and decorative artists, while the kitchen and the bathroom will be the basis of another for electrical contractors, with the object of demonstrating the ideal use and security of electrical equipment in these rooms. When the results of the competition have been decided by a distinguished committee of assessors, the winning designs will be incorporated in the "Pavilion of Light." Full particulars and rules of the competition will be announced at an early date.

Dutch Radio Exports.

The exports of wireless sets and accessories from Holland continue to increase. In August the quantity amounted to 999 gross tons as compared with 327 tons in the corresponding month of last year, the value being 7,123,000 fl. The exports to England in August were considerably augmented, and represented 346 tons out of the total mentioned. For the eight months ended with August the exports are given at 6,391 tons, against 2,218 tons in the corresponding period of last year, the value rising to 51,989,000 fl. from 12,402,000 fl.

The German Cable Industry.

Business in the German cable industry is not altogether satisfactory, says the *Deutsche Bergwerks Zeitung*, and, in view of the approach of winter, will probably grow worse. It is said that various concerns already intend to restrict production. Prices have remained comparatively steady of late after they had been advancing slightly since the beginning of the year owing to the higher production costs. The trend of the copper and lead quotations naturally has a very marked effect on the prices for cable products. At the moment buyers are very reserved; the public authorities appear to have cut down their expenditure recently in many ways. Export business has increased rather appreciably during the last few years. In 1927, 42,000 tons of cables, valued at 40,000,000 marks, were shipped abroad, rising in 1928 to 49,000 tons, valued at 47,000,000 marks. From January to the end of July this year 33,500 tons, valued at 35,000,000 marks, had already been exported.—*Reuter's Trade Service* (Düsseldorf).

A Central Electricity Board Contract.

The Tees-side Bridge and Engineering Works, Ltd., Middlesbrough, has received an order from the Central Electricity Board for steel structural work in connection with the Mid-East England Electricity Scheme. About six thousand tons of steel are involved in the contract, which will take two years to complete.

The De-Rating Scheme.

The provisions by which manufacturers will be relieved of three-quarters of their rates came into operation on Tuesday last. It is anticipated that the relief will give a considerable impetus to trade, particularly in the iron and coal industries. *The Times*, in a recent review of the probable results, mentioned that in Coventry the assistance afforded by the scheme would be considerably offset by the increased cost of power. The assessment of the electricity undertaking had been so substantially increased that it had been necessary to add 13 per cent. to electricity charges.

Unemployment.

The number of registered unemployed persons on September 16th totalled 1,147,500, a decrease of 2,192 since September 9th, at which date the number was 1,149,692. The corresponding figure for September 17th, 1928, was 1,293,659.

A Supply Company's Propaganda.

We have received from the West Gloucestershire Power Co., Ltd., a booklet entitled "Electricity in the Home," in which particulars are given of a home fully equipped with electrical domestic appliances, with some useful hints regarding the types of fittings for various rooms. The company's charges for electric service are explained, and information is given to intending users as to where and how a supply can be obtained, with notes on the choice of contractor. Examples of the cost of electricity in the home are also given, and the amount of electricity consumed in a given time by various appliances. Illustrations of the "all-electric" demonstration house at Ryeford are included.

Wholesalers at the Newcastle Exhibition.

We reproduce herewith a photograph of members of the Council of the Electrical Wholesalers' Federation who visited the North-East Coast Exhibition, Newcastle, at the invitation

E.W.F. Councillors at the Newcastle Exhibition.

of the North-East Coast Section of the E.W.F., on September 5th. Included in the photograph are the president, Mr. J. Wilson, of Middlesbrough; the secretary, Mr. J. W. McKay; and the chairman, Mr. H. Barkes.

Electrical Regulations in New Zealand.

The Department of Overseas Trade has received from the office of the Trade Commissioner at Wellington reprints of (1) the schedule of amendments of the Electrical Supply Regulations, 1927; (2) the schedule of amendments of the Electrical Wiring Regulations, 1927. These reprints are available for loan to British firms interested on application to the Department, 35, Old Queen Street, London, S.W.1. Reference B5701 should be quoted.

New Municipal Showrooms.

The members of the Worcester City Council paid an official visit last week to the Corporation's new electrical showrooms in Queen Street. The rooms have been designed by the borough electrical engineer, and are of a thoroughly up-to-date character. The display shows the latest improvements in lighting and electrical domestic equipment for cooking, heating, &c.

New G.E.C. Lamp Price Indicator.

The General Electric Co., Ltd. has issued a revised edition of its "Osram" automobile lamp price indicator. This takes account of the recent price reductions. The indicator can either be hung on a wall or stood on the counter. In shape it is an enlarged representation of an "Osram" headlight lamp.

The E.D.A. October Programme.

The accompanying illustration is reproduced from the October supplementary programme of the British Electrical Development Association. It depicts the suggested window display for the month, the necessary materials (apart from the actual appliances) being obtainable from the Association. The subject is, as usual, appropriate to the month and with the suggested colour lighting scheme the display should be very effective. Three new posters have been produced, two of them —"A Warm Welcome" and "Fire Without Smoke" attractively advertise electric heating. In the latter, attention is specially drawn to the "outlet." A switch-plug is also fairly prominent in the third poster, "Winter Nights are Cheerful Nights," which deals with electric lighting and shows two or three modern fittings in a comfortable setting. The programme also contains a list of the appropriate E.D.A. publications, several of which deal with after-hours shop window lighting.

Attention is drawn to the E.D.A. Electric Homes (Outlet) Campaign and to the 1929-30 Sales Conferences. The first of these takes place on October 18th. Sir Andrew Duncan, chairman of the Central Electricity Board, will preside, and Mrs. Gladys Burlton, B.A., will read a paper on "Personal Salesmanship in the Electrical Industry." The second is on November 15th, when the chairman will be Sir John R. Brooke, C.B. (Electricity Commissioner), and Mr. E. E. Sharpe will read a paper entitled "Selling Time Switches." On December 20th there will be a display of kinematograph films. The 1930 part of the programme is as follows:—January 17th, "Domestic Hot Water," by Mr. C. H. Smith (chairman, Sir Hugo Hirst, Bt.); February 21st, "The Electrical Industry and the Architect," by Mr. C. H. Flower (chairman, Mr. Ll. B. Atkinson); and March 21st, subject to be decided by the Conference. The meetings will be held at the Royal Society of Arts, W.C.2. On the back page of the programme are some very useful and interesting "Notes by the Director." These call attention to the benefits of electric heating and the necessity of adequate wiring.

The E.D.A. Window Display for October.

The Association is still following up its 1928-29 Factory-Lighting Campaign. A booklet has been published (E.D.A. 804), in which some results of the Campaign are mentioned. There is a number of illustrations showing the illumination of some works and shops before and after the Campaign had made its effects felt. The fact that good lighting pays is again stressed in the booklet, and manufacturers are asked to look at their electric lighting installations with a critical eye, several points for attention being set out.

Indian Electrical Imports.

The *Board of Trade Journal* states that the imports of electrical machinery into India during the June quarter of this year were valued at Rs. 61¼ lakhs, against Rs. 54¼ lakhs in the corresponding period of 1928. The share of the United Kingdom rose from Rs. 43 to 45¼ lakhs, and that of Germany from Rs. 2 to 4 lakhs. Shipments from the United States, however, declined from Rs. 6¾ to 5¾ lakhs.

The imports of electrical instruments, apparatus and parts again advanced, from Rs. 79 lakhs to Rs. 98¾ lakhs, of which the British share rose from Rs. 49 lakhs to Rs. 57¼ lakhs. Shipments from the United States advanced from Rs. 9¼ lakhs to Rs. 14 lakhs, and from Germany from Rs. 8¼ lakhs to Rs. 12¼ lakhs. There were also slightly larger shipments from Holland, Rs. 5¼ lakhs; Italy, Rs. 4¼ lakhs; and Japan, Rs. 1¼ lakhs. Analysing the total, it is found that imports of electric fans and parts thereof rose from Rs. 9¾ lakhs to Rs. 14 lakhs, of which the British share rose to Rs. 6¼ lakhs and the Italian share to Rs. 4 lakhs. The share of the United States was Rs. 1¼ lakhs. Imports of electric wires and cables advanced from Rs. 23½ lakhs to Rs. 31½ lakhs, of which the British share was Rs. 26 lakhs. Shipments from Germany amounted to Rs. 2 lakhs, and from Holland Rs. 1¼ lakhs. The value of accumulators imported rose slightly to Rs. 3¼ lakhs, of which the British share was Rs. 2¾ lakhs. Imports of electric lighting accessories and fittings (including switches) declined from Rs. 4¾ lakhs to Rs. 4 lakhs, of which the British share was Rs. 2¼ lakhs. Meters to the value of Rs. 3 lakhs were imported, of which the British share was Rs. 2¼ lakhs. Imports of electrical goods and apparatus not enumerated increased from Rs. 11½ lakhs to Rs. 14 lakhs, of which the British share was Rs. 9½ lakhs, that of Germany Rs. 1¼ lakhs, and of the United States Rs. 2 lakhs.

There was a sharp decline in imports of radio apparatus from Rs. 3¼ lakhs to Rs. 1¼ lakhs, and the British share fell from Rs. 2¼ lakhs to Rs. 1 lakh. Imports from Germany also fell from Rs. 55,000 to Rs. 19,000, and from the United States from Rs. 34,000 to Rs. 19,000. Imports from Holland rose from Rs. 17,000 to Rs. 26,000.

The E.D.A. Outlet Campaign.

A good audience gathered together at the Manchester Demonstration Bureau last week for the first Conference of the E.D.A. Electric Homes Campaign. Mr. H. C. Lamb, of the Manchester Corporation Electricity Department, took the chair, and emphasised the importance and value of the campaign in endeavouring to put an end to the construction of houses without adequate facilities for electrical appliances. Lt.-Col. Vignoles, the director of E.D.A., outlined the objects and methods of carrying out the campaign, and referred to its appeal to the general public, the housewife, and the architect and builder. He also expressed the opinion that the campaign was likely to become part of the permanent work of E.D.A. An interesting discussion followed, in which every speaker approved of the campaign in the main, and several offered valuable suggestions. Mr. Romero, of Salford, said that the word "plug-point," mentioned by Col. Vignoles, was an excellent solution to the name problem, as it combined the idea of position with plug. Mr. Hutchinson, of the Farnworth Electricity Supply, said that the campaign ought to be extended to embrace old houses, and not be content with attracting the attention of new householders. In his area they were constantly extending the supply to old houses. Mr. Hazel, of the Liverpool Corporation, said that there was not much necessity to appeal to the architect and builder, as he found that they mostly knew all about correct wiring. It was the general public who wanted educating to the idea of more plugs. Mr. Simpson, of the Preston Electricity Department, remarked that in his area the average consumption per house was as high as 1,460 kWh a year. He suggested that "service-point" would be a good alternative to "outlet." Replying, Colonel Vignoles said that he was interested in Mr. Simpson's statement with regard to the high consumption in Preston, and this confirmed his view that the average household consumption in this country was higher than that in the United States. He would like other supply authorities to send along their figures, as they were very interesting and difficult to obtain.

A meeting was held on September 25th at the Birmingham Chamber of Commerce to inaugurate the new campaign to promote the wider use of electricity for domestic purposes in the South Midlands, Mr. R. A. Chattock presiding. There were present many members of the Birmingham branch of the Electrical Association of Women. Lieut.-Col. W. A. Vignoles said the object of the campaign was to encourage the demand for adequate wiring in homes. Only a small proportion of houses were at present adequately wired, a state of affairs for which there was now little excuse, since roughly 60 per cent. of the population lived in areas where electricity was supplied at about 1d. per kWh for purposes other than lighting. As the demand increased the price would be still further reduced. In the modern home adequate arrangements should be made for the use of electricity in every room.

Wages in the Electric Cable-making Industry.

The Joint Industrial Council for the Electrical Cable-Making Industry informs us that, although there would ordinarily be no cost-of-living alteration in wages on the third pay-day in October, at the request of the trades unions for an increase in wages, it has been agreed to advance time-workers' wages by the equivalent of one step up in the sliding scale. Therefore the rate of wages will be equivalent to the scale for a cost-of-living index of 67½-75.

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The A.E.G. in Central America.

The Allgemeine Elektricitäts Gesellschaft, which recently constructed the National Electric Light Co.'s plant in Panama, has now, according to a New York message, acquired control of the company by share purchase. This concern is in competition with the Panama Power & Light Co., which is American. This is not the first enterprise of the A.E.G. in this connection. Recently it acquired a power station in the Costa Rican capital, San Jose, which was likewise run in competition with an American concern. In this case, however, the rivalry was eventually ended by the union of the two concerns under joint management.—*Financial News.*

London Lighting Fittings Showrooms.

Lighting Trades, Ltd., which incorporates the businesses of the Welsbach Lighting Co., Ltd., and J. & W. B. Smith, Ltd., has arranged excellent showrooms at its headquarters, Oriel House, Farringdon Street, E.C.4, in which the best fittings of the two older concerns are displayed. Although the collection is an extensive and representative one, its effect is not marred by overcrowding, as is so often the case. The designs which are to be seen are adapted to all tastes and pockets, ranging from costly alabaster and art-metal pendants to inexpensive glass shades. A special feature is made of "Moonmist" pressed glassware, which is shown in a multitude of forms and designs. In addition to the lighting fittings, the company has on view examples of its electric fires and small domestic appliances. A view of the main showroom is reproduced herewith.

The Showrooms of Lighting Trades, Ltd.

Local Exhibitions.

Glasgow.—Electricity occupied a prominent place in the Corporation Housing and Health Exhibition, which was opened in the Kelvin Hall on September 25th by Sir James Barrie. Glasgow Corporation Electricity Department has four stands at which demonstrations are given of electric cookers, fires, and water heaters. There is also a modern electric kitchen, showing time- and labour-saving electrical devices. Another attractive display is that arranged by the Clyde Valley Electrical Power Co. In addition to electrical appliances for cooking, washing, cleaning, lighting and heating, there is a well-appointed kitchen, lounge, and fire showroom. Among the other electrical exhibitors are the following:—Entwistle & Kenyon, Ltd.; the Carron Company; Ross's Dairies, Ltd.; Young, Osmond & Young, Ltd.; Singer Sewing Machine Co.; the British Vacuum Cleaner and Engineering Co.; Tellus Electric Cleaner Co.; Allied Ironfounders, Ltd.; W. J. Hannah & Co.; the British Horo-Electric, Ltd.; Triplex Foundry, Ltd.; Smith & Wellstood, Ltd.; Dominion Machinery Co., Ltd.; the Edison Swan Electric Co., Ltd.; Archibald Low & Sons, Ltd.; Hoover, Ltd.; and Electrolux, Ltd. The apparatus demonstrated on the stands of the Corporation and the Clyde Valley Company includes products manufactured by the Hotpoint Electric Appliance Co., Ltd., the General Electric Co., Ltd., Belling & Co., Berry's Electric (1928), Ltd., and the Credenda Conduits Co., Ltd.

Brighton.—An electrical exhibition, organised jointly by the Brighton Corporation Electricity Department and the British Electrical Development Association, will be officially opened by the Mayor (Alderman H. J. Galliers) on October 10th. It will remain open until October 19th. The exhibition is being held in the Corn Exchange and Dome Buildings, and the former is divided into three main sections, devoted, respectively, to water heating, cooking and heavy appliances, and a fully-equipped hotel and restaurant kitchen. In the water-heating section there will be a series of rooms equipped with baths and toilet basins, with the various makers' water-heating apparatus in operation. The exhibit will be the most comprehensive water-heating display yet seen in this country. The food prepared and cooked in the hotel and restaurant section will be served at the exhibition restaurant. The exhibits in the Dome will comprise fittings, fires, refrigerators, and miscellaneous appliances. A series of electrical demonstration tableaux will be staged by the E.D.A. on the E.L.M.A. stand. Recitals will be given on the Dome organ during the exhibition. Admission will be by ticket, price 6d.

Recent Contracts.

Messrs. Hick, Hargreaves & Co., Ltd. have secured a contract for the complete power equipment of a large cotton mill being built at Heera, in the state of Gwalior, Central India. The mill will have 35,000 spindles and 1,000 looms, with an ultimate capacity for 55,000 spindles and 1,500 looms. The power drive will be a combination of rope and electric transmission, and will be supplied by two Hick, Hargreaves high-speed impulse turbines

Messrs. Boving & Co., Ltd., have received the contract for the new 60,000-b.h.p. water turbine plant ordered by the Hidroelectrica Iberica, Spain. The head is 345 metres, and the speed of each of the two units is 428 r.p.m., the turbines being of the Pelton type. This is an extension of the existing Rio Cinca plant of 61,500 h.p., consisting of three units, which were also supplied by Boving & Co. The new Peltons will be equipped with stainless steel buckets. It is claimed that the new machines are amongst the most powerful single-wheel units in the world. Boving and Co. have also received an order for two vertical shaft Francis-type turbines for the New Zealand Government's development at Waitaki. Each turbine will have an output of 23,000 b.h.p. at 125 r.p.m. on a head of 70 ft. The wheels of these turbines will have an overall diameter of 13 ft. 6 in., and the company states that they will thus be the largest ever built in Great Britain. The company has recently shipped to Palestine the two turbines for the first stage of the Jordan development undertaken by Mr. Rutenberg, and these units will have an output of 8,500 h.p. at 250 r.p.m. on an 88 ft. head. Stainless steel has been used for the wheels, and the company is supplying all the gates, stop logs and their lifting equipment as well as the pipelines for this scheme. Messrs. Boving & Co. also have a large number of other important orders in hand for all parts of the world.

Asea Electric, Ltd., Manchester, has received an order for the complete electrical equipment of the Dicken Green Mill, Rochdale, including a slow-speed alternator and between 50 and 60 motors.

The Westinghouse Brake & Saxby Signal Co., Ltd., in competition with German firms, has secured the contract for the complete signalling system for the new central railway station at Johannesburg. The system will be "all-electric" with power-operated points and colour-light signals.

Conditions in Estonia.

Estonia is one of the smaller Baltic States, having a population of about 1,120,000. It is accordingly not likely to be an extensive market for British electrical products. A report on conditions in the Republic has been transmitted to the Department of Overseas Trade by Mr. C. B. Jerram, British Consul at Tallin (Stationery Office, 9d. net). In a commercial summary prefacing this report it is shown that while Great Britain is Estonia's most important customer, it is only third in the import list, Germany and the United States being well ahead. Mr. Jerram says that British goods are "extraordinarily popular" in Estonia and are often purchased at higher prices than those offered by competitors. Foreign competition has to be seriously countered, credit being one direction in which Great Britain lags behind competing countries. Electrical machinery and apparatus is not specially mentioned in the report, but it is shown that non-agricultural machines, motors and vehicles were fifth in the import list in 1928, representing a value of 11,731,000 kr. of a total of 131,370,000 kr. (£1=19 kr. approx.).

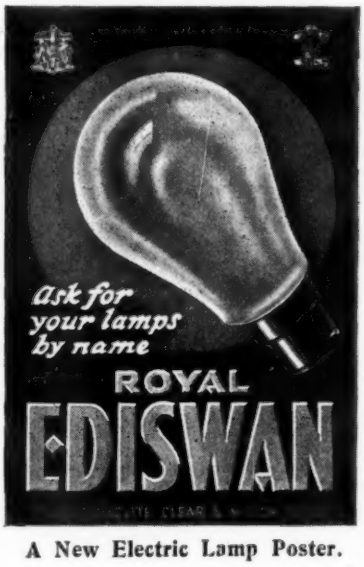
Later in the report it is stated that interest is aroused from time to time, both in Estonia and abroad, in the scheme for the exploitation on a large scale of the Narva rapids. There appears at the moment to be a definite recrudescence of interest in this matter, and it is reported that a foreign firm is at present negotiating with a view to the construction of a power station and a large pulp mill. It appears that without the pulp mill there would hardly be sufficient market for the power in the near future to warrant the construction of the station. There would seem to be several difficulties to be overcome connected with such considerations as (*a*) the supply of timber for pulp, which would have to be obtained from the

Soviet Union, (*b*) a clause in the Estonian-Soviet Peace Treaty of 1920 providing that the Soviet Union should have preferential rights to obtain electric power from the Narva rapids, and (*c*) the claims of the factories situated at the rapids, which already generate power therefrom. It is at present impossible to say whether the negotiations now proceeding will lead to any immediate result.

The *Board of Trade Journal* states that during July last Estonia imported "electric machines, apparatus, and implements" valued at 160,100 kr. (£8,800), and exported similar goods to the value of 37,300 kr. (£2,000).

The "Ediswan" Lamp Campaign.

We have received from the Edison Swan Electric Co., Ltd., a broadsheet setting forth details of its winter lamp campaign,



A New Electric Lamp Poster.

together with samples of the booklets, &c., which are being distributed. In common with other lamp makers, the Ediswan Company concentrates attention on its Pearl lamps, and the principal feature of the campaign is a simple but colourful poster design depicting one of these lamps (see accompanying figure). The catalogues are attractively produced and contain full details and prices. The broadsheet contains a list of towns in which the "Royal Ediswan" poster will be displayed, and it illustrates illuminated signs and window displays which are available for retailers' use. The leading device for window displays is an animated centre piece produced in delightful colours.

New Argentine Company.

Particulars of the Ferro-Carril Central de Buenos Aires, Limitada, were filed on September 19th. The authorised capital is $25,000,000, of which, to June 30th, 1928, $22,565,000 (£1,969,960) had been issued. The company was incorporated in the Argentine Republic, to continue the construction and working of railways for the transport of merchandise and passengers with steam or electric traction already granted or applied for by Lacroze Hermanos y Compania. The registered office is in Buenos Aires, and the British address is at 4, Moorgate, E.C.2, where Mr. M. A. Edwards is authorised to accept service of process and notices on behalf of the company. The directors are: T. Lacroze, L. J. Rocca, Ana B. de Lacroze, and F. Lacroze, all of Buenos Aires, and directors of the Compania Tramways Lacroze de Buenos Aires, Ltda., and Cia de Luz y Fuerza Lacroze de Buenos Aires, Ltda.

Miners' Safety Lamps.

The Secretary for Mines has made an Order under Section 33 of the Coal Mines Act, 1911, approving the Ringrose miners' lamp for use in all mines to which the Act applies, subject to certain conditions set out in the Order.

Wages in the Electrical Contracting Industry.

The variation in the cost of living since the last alteration of wages in the electrical contracting industry justifies a reduction of ¼d. per hour for all grades. The rates, which will, therefore, come into operation on the second pay-day in October, for the period covered by that pay-day, will be as follows:—Grade A, 1s. 10¼d.; Grade B, 1s. 7¼d.; Grade C, 1s. 5¼d.; and Grade D, 1s. 4¼d. The Grade A rate includes the increase of 5 per cent. which came into operation in May last, and remains in force up to and including the last pay-day in October. The new rates for Grades B, C and D will remain current up to and including the period covered by the first pay-day in February, 1930.

Trade Announcements.

Mr. G. Ellam, wholesale electrical supplier, has removed to 49, Gartside Street, Bridge Street, Manchester. The telephone number (Central 8213) is unaltered.

Messrs. Hardman & Co., Ltd., The Baum, Rochdale, Lancs., have been appointed by Abbey Cables, Ltd., as its sole agents for Lancashire, and will carry stocks at 9-13, Miller Street, Manchester. (Telephone: Blackfriars 1060.)

Messrs. Haslam & Stretton, Ltd., 53, 54 & 55, Tredegar Street, Cardiff, have been appointed by the Credenda Conduits Co., Ltd., as agents for the South Wales (Cardiff) area.

Messrs. Norman Hope & Partners, 61, Wind Street, Swansea, have been appointed by Messrs. James Gordon and Co., Ltd., as their representatives in South Wales.

The Lisenin Wireless Co., has removed to 5, Central Buildings, High Street, Slough. (Telephone: Slough 652; telegrams: "Posgrip," Slough).

The business of C. B. King (Magnetos), Ltd., has been amalgamated with that of the London Magneto Repairing & Winding Co., Ltd., and all communications should be addressed to 78, Hampstead Road, Euston, N.W.1. (Telephone Nos.: Museum 1033, 1158 and 1159.) Mr. C. E. Walker will still be associated with the business.

Mr. A. R. Munday, 190, West Regent Street, Glasgow, has been appointed Scottish agent for the wood electrical fittings of Woodfyt Sales, Ltd.

The Midland Electric Manufacturing Co., Ltd., has erected and equipped a new extension to its works. The new department will be entirely separate from the main works, and will be known as the "Special and Service Department." It is intended to deal with the erection of unit type control panels, variations of M.E.M. gear to suit special requirements, &c.

Messrs. E. R. Morton, Ltd., have removed to 22, Bartlett's Buildings, Holborn Circus, E.C.4. (Telephone: Central 8867; telegrams: "Morelect, Fleet, London."

A Novel Church Lighting Scheme.

A novel and effective church lighting scheme has recently been completed at the Roman Catholic Church, Lyndhurst, by the installation department of the West Hampshire Electricity Company, Ltd. Suspended fittings are not employed. The lamps are placed between the arched ceiling and the true

The Lighting of Lyndhurst R.C. Church.

roof in Metro-Vick reflector fittings, and the only visible evidence of an electrical installation is provided by the corrugated fronts of the reflector fittings, which lie flush on the surface of the ceiling. The lighting is remarkably soft and free from shadow, as will be seen from the accompanying photograph, and the scheme has attracted considerable local interest.

Book Notices.

"*Elektrotechnická Rocenka, E.S.C.*, 1929" (Year Book of the Czechoslovak Electrical Association, 1929). Pp. 296; illustrated. Prague: Elektrotechnicky svaz Ceskoslovensky. Price, 200 Czech. crowns.—The present Year Book is the fourth volume published and commemorates the tenth anniversary of the Czechoslovak Republic and the E.S.C., by describing the evolution of and work performed by the E.S.C. during its existence. When founded its membership amounted to 400, which number has increased to 2,700. The Association includes members of power companies, manufacturers, and electrical engineers. The general section of the publication contains diagrams pertaining to the economic situation, maps and reviews of foreign trade, prices of metals, machines and apparatus. It also contains a list of granted patents and trade marks, and statistics covering the Czechoslovak electrical industry. The system of electrification is covered by three articles. Detailed statistics show that of the total of 457 electric power stations, 311 are the property of power companies, and 146 are operated by manufacturers. The former generated in 1927 719,000,000 kWh with an installed capacity of 396,700 kW. The total energy generated in Czechoslovakia in 1927 reached 1,700 million kWh, which gives an average of 125 kWh *per capita*. This is an increase of 125 per cent. as compared with 1926. There are 13,000 miles of h.p. transmission lines. The electric railways are covered in three articles and further articles deal with telephony, telegraphy, and radio.

"Der Wissenschaftlichen Grundlagen der Preisbildung fur die Elektrische Arbeit," by Dr. W. Kummer. Brunswick: Friedr. Vieweg & Sohn, A.G. 4s.—This little book forms No. 100 of the series of the German technical handbooks published by the Brunswick firm of Vieweg. It is from the pen of Dr. W. Kummer, one of the engineering professors at the Technical High School of Zurich, who, in a short preface, states that, despite the fact that there is now fifty years' experience of electricity supply undertakings to draw upon, there is still room for improvement in the methods of scientifically determining operating costs and for fixing the rates for electricity supply on a profitable basis, and it is a contribution to this subject that the author now offers. Dr. Kummer first deals with the matter from the consumption point of view, in order to demonstrate the variation which takes place in the daily load and its effect, this being followed by a chapter in which the working costs of steam and hydraulic power stations and of those plants with abnormal load factors are discussed. He makes some suggestions as to the fixing of prices, the subject of uniform tariffs being also discussed.

"*Transactions* of the Institution of Engineers, Australia." Vol. VII, 1926. Sydney, N.S.W.: The Institution.

"*Journal* of the Institution of Engineers, Australia." Vol. I. No. 8. August, 1929. Sydney, N.S.W. Price 7s. 6d.

Bankruptcy Proceedings.

G. F. A. Stone (trading as the Stone Manufacturing Co.), electrical accessories manufacturer, 108, Great Saffron Hill, E.C., and 422, Pinner Road, Harrow.—The first meeting of creditors was held on September 25th, before Mr. V. Armstrong, Assistant Official Receiver, at the London Bankruptcy Court. The debtor petitioned the Court on September 12th, and was adjudged bankrupt the same day. He has lodged a statement of affairs showing liabilities of £1,889 to rank for dividend, against net assets valued at £177, after deducting £68 for payment of the preferential claims. The debtor states that he began business on his own account in 1920, under the style of the General Maintenance Electric Co., at 14, High Street, Pinner, having a capital of between £150 and £200. After trading for twelve months, his business was taken over by the Modern Electric Co., Ltd., and he was appointed sales manager. When that company went into liquidation eighteen months later he restarted business for himself at Finsbury Place under the style of the Lighting Supply Co. That business was successful, and after two years was taken over by a company, of which he acted as joint managing director until July, 1927, when a receiver was appointed and the company was wound up. He again started on his own account, taking premises in Great Saffron Hill, and trading as the Stone Manufacturing Co. The failure is attributed to delay in delivery of raw materials and insufficiency of capital. The case was left in the hands of the Official Receiver. The following are creditors:—

	£		£
Brownie Wireless Co. ...	230	McLeod & McLeod ...	80
Bearfield	37	Maydew	44
Ebonestos Insulators ...	119	Parr's Advertising ...	116
Handells, Ltd.	49	Reyner	70
High Tension Bakelized Products	48	Samuel Lee Batty ...	34
Johnson & Watts ...	100	Spicer's	30
Lewis Banks & Sons ...	214	Turner & Co.	42
		Waines	70

E. R. Millward, trading as "West of England Radio," 67, High Street, Barnstaple, wireless engineer.—The receiving order herein was made on the debtor's own petition on April 29th of this year. According to his statement of affairs, there are liabilities of £1,030, all due to unsecured creditors, against assets estimated to produce £182, leaving a deficiency of £848. The debtor attributed his failure to insufficient profits to meet heavy trade expenses, including motor-car upkeep; giving long-term credit on hire-purchase of wireless sets, whereas his credit was generally one month; costs added to debts by creditors suing; and ill-health. He commenced trading on his own account in December, 1926, with a capital of £25. He states that his financial difficulties were primarily due to the trade being insufficient to meet his expenses, which he estimated at 50s. a week. In January, 1928, a friend guaranteed his bank account to the extent of £20. In April another lent him £100, which has not been repaid, and at various times last year he had been lent sums amounting to £41, of which £34 had been repaid. In November of last year a relative lent him £200 to pay pressing creditors. When he was taken ill in March of this year, the solicitors took charge and disposed of the trade fittings, etc., at the shop for £12, paid the rent to April 13th, and removed the stock. All work was suspended. He states that he first became aware of his position in March last, whereupon he wrote to some of the creditors with the object of getting longer credit in order to pull the business round.

G. T. Baines, 66, High Street, Gorleston, Suffolk, electrical and wireless engineer.—The public examination herein was held recently at Great Yarmouth, when a statement of affairs was produced showing liabilities of £350, and a deficiency of £295. The debtor commenced trading on his own account in 1925 with practically no capital. He sustained an accident a year later, and for two years he was totally incapacitated. In March, 1928, he restarted, with £40 borrowed, which he has since repaid. He states that goods were invoiced to him on a *pro forma* invoice, but were not delivered. The suppliers sued him and judgment was given against him for £22, including £10 for costs. The examination was closed.

J. C. Roger, wireless dealer, &c., 14, The Crescent, 95, Lower Broughton Road, Salford.—First and final dividend of 8½d. in the £, payable October 8th at the offices of Mr. J. F. Warburton, 23, Queen Victoria Stree,t Manchester.

J. H. B. Tattersall (H. Tattersall), electrician, &c., 456, Burnley Road, Scout Bottom, Waterfoot, Lancs.—First meeting October 7th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination November 1st, at the County Police Court, Rochdale.

B. E. M. Pook, wireless dealer, 53a, Albert Road, Southsea. Trustee, Mr. J. L. Wilkinson, Official Receiver, 87, High Street, Portsmouth, released September 20th.

S. W. Richards (Blackwood Radio and Electrical Supply Depôt), radio engineer and electrical contractor, High Street, Blackwood, Mon.—First and final dividend of 7¾d. in the £, payable October 8th at the Official Receiver's office, 34, Park Place, Cardiff.

Company Liquidations.

National Wireless Corporation, Ltd.—Liquidator, Mr. E. T. A. Phillips, Official Receiver, Carey Street, W.C.; released September 21st.

Bishops Castle Electric Light & Power Co., Ltd.—Liquidator, Mr. O. B. Wallis, Official Receiver, 133, St. Owen Street, Hereford, released October 20th.

British Union Lamp Works, Ltd.—A meeting of members is called for November 4th at the offices of the British Insulated Cables, Ltd., Prescot, Lancs., to hear an account of the winding up from the liquidator, Mr. A. L. Glencross.

Dissolutions of Partnership.

Connal, Hodgson & Co., electrical engineers and wireless experts, The Smelt, Port St. Mary.—Mr. R. C. Connal and Mr. C. Hodgson have dissolved partnership. Mr. Hodgson will continue the business.

Redcliffe Radio Manufacturing Co., Ltd., radio apparatus manufacturers, Phœnix Works, Temple Gate, Bristol.—Mr L. E. Hicks and Mr. R. G. Hawkins have dissolved partnership. Mr. Hawkins will attend to debts and continue the business.

New Catalogues and Lists.

Messrs. Gent & Co., Ltd., Faraday Works, Leicester.—Book 6b containing descriptive matter relating to liquid-level indicating, recording, and alarm signals for waterworks, &c.

Metro-Vick Supplies, Trafford Park, Manchester.—Brochure No. 7150/8 and folder 7150/9 giving particulars of electric fires, including illustrations of imitation coal fires. A special discount is allowed to retailers on the first order for a specified number of fires.

Houghton-Butcher (Great Britain), Ltd., High Holborn, W.C.1.—Two pamphlets outlining the company's radio hire-purchase system.

Messrs. J. J. Eastick & Sons, Eelex House, 118, Bunhill Row, E.C.1.—A comprehensive catalogue (pp. 243) of wireless and electrical specialities. Numerous illustrations are included and the publication is fully indexed and priced.

The Wholesale Fittings Co., Ltd., 23, 25, 27 and 37, Commercial Street, E.1.—List No. 238 of the company's lighting glassware. Fully illustrated and priced.

Korting & Mathiesen Electrical, Ltd., 711 and 715, Fulham Road, S.W.6.—List No. F.1829, describing and illustrating Kandem "Winlux" shop-window reflectors. Priced.

London Electric Firm, Brighton Road, South Croydon.—A pamphlet notifying the purchase from Messrs. Henry Williams, Ltd., of Darlington, of the branch of their business recently trading as the Arc Lamp Lowering Gear Co. Also several leaflets describing lowering gear and suspension lighting installations carried out by the company.

British Illuminated Glassware Co., Ltd., High Street, Portslade.—An illustrated price list of lamp shades and bowl fittings.

Messrs. Newton & Wright, Ltd., 471-3, Hornsey Road, N.19.—Publication No. B/29, giving particulars of X-ray tubes, Holway valves, and high-tension accessories, with illustrations and prices.

London Electric Wire Co. & Smiths, Ltd., Church Road, Leyton, E.10.—A catalogue of "Lewcos" radio components, which includes a number of new designs.

British Home and Office Telephone Co., Ltd., 161a-166, Strand, W.C.2.—A leaflet drawing attention to the company's intercommunicating telephone service.

British Electrical and Manufacturing Co., 7 to 13, Clavering Place, Newcastle-on-Tyne.—A brochure issued as a memento of the company's 30 years' experience in the electrical trade, containing illustrations of its various departments.

Simplex Conduits, Ltd., Garrison Lane, Birmingham.—List No. 1,192, dealing with "Simplex" signs, reflectors, and lanterns. Illustrations and prices are included.

Messrs. L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2.—A folder advertising the new "Universal" washer and dryer and washer and wringer, also a card drawing attention to the Frink corrective system of illumination.

British Brown-Boveri, Ltd., Trafalgar House, Waterloo Place, S.W.1.—A brochure containing some excellent illustrations of electrically-driven machine tools.

Mr. Eric Marx, Central House, 34/36, Oxford Street, W.1.—A catalogue of the "Electra" range of lighting fittings, with illustrations and prices of modern panel fittings.

Messrs. C. A. Parsons & Co., Ltd., Heaton Works, Newcastle-on-Tyne.—A well-produced general catalogue descriptive of the company's turbines and other products. Some excellent illustrations are included.

Messrs. A. P. Lundberg & Sons, Ltd., 477 to 489, Liverpool Road, Holloway, N.7.—Leaflets Nos. EI.79 and EI.80, dealing, respectively, with two-way controls and the d.p. "Twinob" single-phase motor starting switch.

"G. L." Printing & Publishing Service, 33, Cromwell Avenue, Highgate, N.6.—Specimen pages from the G. L. wireless retailers' catalogue. The full catalogue contains 116 pages, and can be supplied to retailers with their own name and matter printed on the cover.

Dugdill's Patents, Hazel Grove, Stockport.—A card giving illustrations and prices of lighting fittings; also a sheet containing a list of repeat orders.

Radio Instruments, Ltd., 12, Hyde Street, New Oxford Street, W.C.1.—A showcard advertising the dual astatic h.f. choke, and a novel folder drawing attention to the R.I. screen-grid all-electric 3-valve receiver. The folder has a flap illustrating the receiver, which is connected by a cord and "adaptor" to a "lampholder," which appears at the top of the folder.

Nox Electric Lamp Co., Ltd., Clarence Road Works, Hunslet, Leeds.—A new price list of the company's lamps.

Messrs. Donovan & Co., 47, Cornwall Street, Birmingham.—A leaflet describing ironclad electric isolating links with floating contacts.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—Catalogue No. SL4,986, giving particulars of stage spotlights. Illustrated and priced.

Automatic Telephone Manufacturing Co., Ltd., Strowger Works, Liverpool.—An illustrated folder dealing with private automatic telephone exchanges.

Messrs. Barber & Colman, Ltd., Brooklands, Manchester.—A number of pamphlets showing the "Shakeproof" lock washers and terminals.

Messrs. Newtons of Taunton, 6, Grape Street, Shaftesbury Avenue, W.C.2.—A folder giving particulars and prices of constant potential battery charging equipment.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Publication No. 7,826/1, describing the company's marine electrical installations, with some excellent illustrations of the company's workshops, products and actual installations.

A.E.G. Electric Co., Ltd., 131, Victoria Street, S.W.1.—A circular letter drawing attention to the company's new season's stock of "Furniculus" fires.

Philips Lamps, Ltd., Philips House, 145, Charing Cross Road, W.C.2.—Three illustrated folders advertising "Argenta" opal lamps and "Arlita" internally-frosted lamps.

Midland Electric Manufacturing Co., Ltd., Barford Street, Birmingham.—List No. 178, giving particulars of the company's new extensions, together with illustrations and prices of some of its products.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—An illustrated leaflet dealing with the application of steering gear motors aboard ship.

New Distributors of Edison Storage Batteries, Ltd., Victoria House, Southampton Row, W.C.1.—A brochure describing the construction of the Edison storage battery with numeoous illustrations of the American company's workshops. Also a number of pamphlets drawing attention to the application of the battery to marine and commercial vehicle work.

Warren Brothers (Middlesbrough), Ltd., 91-93, Grange Road, Middlesbrough.—A booklet containing testimonials regarding the efficiency of the Howard (patent) steam separator on board ship.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Oct. 1st.	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal)	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3½d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£18 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	2¾d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£187	£2 dec.
	Grade II ... ... ,, ,,	£131	£2 dec.
	Grade III ... ... ,, ,,	£72	...
c	Brass (rolled metal 2" to 12" basis) per lb.	10½d.	...
c	,, Tubes (solid drawn) ... ,,	1/0½ to 1/1	...
c	,, Wire, basis ... ... ,,	11½d.	...
c	Copper Tubes (solid drawn) ... ,,	1/8	...
g	,, Bars (best selected) ... per ton	£110	...
g	,, Sheet ... ... ,,	£110	...
g	,, Rod ... ... ,,	£110	...
d	,, (Electrolytic) Bars ... ,,	£84 15s.	5/- dec.
d	,, ,, Sheets ... ,,	£142 10s.	...
d	,, ,, Wire Rods ... ,,	£94 15s.	£/- dec.
d	,, ,, H.C. Wire per lb.	11½d.	...
f	Ebonite Rod... ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	10d.	¾d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton	72/6	...
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	£1 dec.
g	Lead, English pig ... ... ,,	£35	...
g	Mercury ... ... per bot.	£22 10s. to £22 15s.	5/- inc.
e	Mica (in original cases) small ... per lb.	3d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings ,,	1/3½	...
p	,, ,, drawn bars & rods ,,	1/5	...
p	,, ,, rolled strip & sheet ,,	1/6½	...
p	,, ,, wire... ... ... ,,	1/6½	...
o	Platinum ... ... per oz.	£13 17s. 6d.	...
d	Silicium Bronze Wire ... ... per lb.	1/2½	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
g	Tin, Block (English) ... ... per ton	£200 10s. to £200 15s.	£5 5s. to £5 10s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

In their letter dated September 28th, James Forster and Co. states that there is again no feature of interest to report in the lead market. Demand from consumers is quiet, although consumption is very well maintained, the buying being mostly of a hand-to-mouth nature. Conditions on the Continent are also quiet. Nothing is in sight at the moment to alter the present condition of affairs, and there seems little likelihood of higher prices in the near future.

For Sale.

Leicester Corporation has for disposal one motor-generator set. The Guardians of West Ham Union offer for sale a quantity of second-hand electrical machinery. The West Central Merchandise Mart will sell by auction at York House, Southampton Row, W.C., on October 8th, a stock of English and Continental lighting cables, electrical fittings, and radio goods. (See our advertisement pages to-day.)

Leicester Accepts a Swiss Tender.

At its last week's meeting the Leicester City Council decided to accept a Swiss tender for steam turbine plant at £15,700; the lowest British offer was £17,082. Councillor A. H. Swain, chairman of the Electricity Committee, said that if they eliminated foreign competition they would find that they would have to pay "ring" prices for electrical plant. Councillor Pearce said that half of the cost represented wages; that meant that £8,500 was lost to British workers. Councillor Swain stated that £3,500 of the amount would be spent in England; British manufacturers did not use all British material in their plant.

New French Companies.

Among the companies recently formed in France are the Société Sateco, Paris (9, Rue Murat), capital 1,800,000 fr., to establish electric power transmission lines; the Société Hydro-Electrique du Midi, Paris (54, Boulevard Haussmann), capital 20 million fr., to establish hydro-electric stations in Central France; and La Société Universelle de Radiophonie Automatique (S.U.R.A.), Paris (69-71, Rue de Clichy), capital 250,000 fr.

Lighting and Power Notes.

Bedford.—Electricity Supply Extensions.—Recently the Corporation Electricity Committee agreed to an extension from Kempston to Wootten Pillinge of the existing 11,000-V supply to meet an increased demand by the London Brick Co. and Forders, Ltd., and for the purposes of a general supply to the intervening rural area. The estimated cost of these works was £4,900. The company has now decided to install 840 kW of additional plant. To meet this further increase in the demand it will be necessary not only to extend the existing main from Kempston to Wootton Pillinge, but also to lay a duplicate main from the generating station to Wootton Pillinge and to provide additional transformers. The Committee has decided to recommend that the necessary works shall be carried out at a cost of £13,400.

Brighton.—Station Extensions.—The Corporation Electricity Committee has decided to proceed with the extensions to the Portobello station in connection with the supply to the sewage outfall works, at a cost of £7,250.

Street Lighting.—The Corporation Electricity Committee has decided to proceed with part of the street lighting scheme to Patcham Place at a cost of £700.

Loan Sanctioned.—The Corporation Electricity Committee has obtained sanction to a loan of £12,200, in connection with the alteration of the system and pressure in the Patcham area.

Colne.—Loan.—The Town Council has decided to apply for sanction to a loan of £4,400 for the supply of electricity to Trawden.

Continental.—Sweden.—The large hydro-electric power station at Lanforsen on the Dalaelven river, which is being constructed jointly for the town of Stockholm and Sandvikens Jaernverks Aktiebolag, will soon be completed. The buildings are ready, and the large Kaplan turbines are being put in; only two turbo-generators are being installed at first, each producing normally 11,000 h.p. with a maximum of 13,000 h.p. A third will probably be installed soon and, as there is room for a fourth, the power station may eventually be able to produce a maximum of 52,000 h.p. The construction costs amount to Kr. 10,000,000.—*Reuter's Trade Service* (Stockholm).

According to *Stockholms Tidningen*, the construction of the hydro-electric station on the Indal River to utilise the power of the Krangede rapids is to begin in 1932, and is to be completed in 1936. The total cost of the undertaking is estimated at about £773,000. When the plant, which will be the biggest privately-owned station hitherto constructed in Sweden, is completed, electric power will for the first time be distributed from a power station in North Sweden to consumers in the central part of the country. The Krangede power plant will have an initial capacity of 50,000 kW, but it is possible that it will be extended to 150,000 kW. The three biggest existing power stations in Sweden are Trollhattan (170,000 h.p.), Porjus (80,000 h.p.) and Alvkarleby (75,000 h.p.), which are all government-owned.

Germany.—A proposal to dam the valley of the Our between Ouren and Stolzenburg, near the Luxemburg frontier, will, when carried out, result in the formation of one of the largest reservoirs in Europe. The reservoir, which, in addition to the Our valley, will also embrace several side valleys, will have a length of nineteen miles and a storage capacity of eight hundred million cu. metres. The water power obtained is to be utilised by the Allgemeine Elektricitäts Gesellschaft for generating electricity, which will be distributed to the existing Rhenish and Westphalian power centres, to Hesse-Nassau, and in a westerly direction to Luxemburg, Belgium and France. The cost of the scheme, which is shortly to be put in hand, is estimated at £6,000,000.—*Reuter* (Cologne).

Belgium.—Rapid progress is being made in connection with the electrification of Eastern Flanders, and it is estimated that, by the end of the current year, 194 out of 197 communes in the province will have a supply of electricity available. The work has entailed the installation of over 390 miles of h.p. transmission lines, 675 miles of l.p. mains, and 327 transformer stations and boxes.

Coventry.—Loan.—The City Council has applied for sanction to a loan of £4,846 for mains extensions.

Price Reduction.—The City Council has reduced the flat rate for power (low-pressure supply) and heating from 1¾d. to 1½d. per kWh, for lighting from 4½d. to 4d., and for prepayment meters from 5d. to 4½d.

Croydon.—Mains Extensions.—The Corporation Electricity Committee reports that it has already sanctioned expenditure in connection with a supply to the Waddon Mills, amounting to £2,300. An application has been received for a supply to another factory on adjoining land, and the committee recommends that this supply shall be given by extending the cables from Waddon Mills to the factory at a cost of £2,660. The committee has also decided, in connection with further supplies required at the Post Office exchange and other premises in Surrey Street, to lay an e.h.p. main from Drummond Road sub-station to the Surrey Street sub-station, at an estimated cost of £1,800, inclusive of switchgear.

Loans.—The Electricity Committee has obtained sanction to loans of £70,000 for buildings, civil engineering works and concrete cooling tower, and £200,000 for generating plant.

Church Lighting.—The Electricity Committee has considered representations with regard to the price of electricity for the lighting of places of worship, and recommends that where the borough electrical engineer is satisfied that the supply is a non-peak demand and will only be used during the evenings of Sunday and Wednesday, a special discount of 33 per cent. be allowed off the flat rate of 6½d. per kWh.

Darlington.—Fringe Order.—The Corporation has received a letter from the Electricity Commissioners, stating that the Cleveland and Durham Electric Power, Ltd., has applied for a revocation of the Fringe Order under which the Corporation supplies electricity to certain houses in the parish of Haughton-le-Skerne. The Commissioners have asked whether, in the event of the Corporation desiring to continue its supply to the Fringe Order consumers, it would be prepared to take over the powers hitherto held by the company in respect of the parishes of Barmpton, Great Burdon, Haughton-le-Skerne, Norton Palms, Neasham, Sadberge, and Whessoe, and to pay the company compensation for expenditure incurred on works in these parishes. The Electricity Committee has recommended agreement to the suggestion of the Commissioners and making application for a Special Order to supply electricity in the parishes named.

Dover.—Bulk Supply.—The Corporation Electricity Committee has recommended that a scheme put forward by the Central Electricity Board for the shutting down of the local plant and for the taking of a bulk supply shall be agreed to in principle, and that a more exact estimate of the total cost be obtained. According to the proposed scheme the bulk supply would be taken from the Board's sub-station near Folkestone at 33,000 V and reduced to 6,600 V, by means of transformers and switchgear provided by the Board. The supply would be metered at 6,600 V, and the price paid for the supply would be as follows:—Not exceeding £3 17s. 6d. per kW of maximum demand during any half-hour in the months of November and December in the year of account plus 0.2d. per kWh supplied, the "unit" charge to be subject to an increase or decrease of 0.001d. for each penny by which the cost of delivering coal to the Board's stations shall rise above or fall below 16s. 6d. per ton A contribution of £6,000 would be made towards the cost of changing the frequency.

East Ham.—New Cables.—The Corporation Electricity Committee has passed an estimate for distributor cables of £3,308.

Guildford.—Loan.—The Corporation Electricity Committee is to seek sanction to a loan of £20,000 for mains and services.

Two-part Tariffs.—The Town Council has adopted the following two-part tariffs:—Commercial lighting, £15 per kW plus 1d. per kWh. Private dwelling houses, 15 per cent. on rateable value up to £60, 12½ per cent. from £61 to £75, 10 per cent. from £76 to £100, and 7½ per cent. beyond, with a charge of ¾d. per kWh in the old area, and 1d. per kWh in the outer area.

Huddersfield.—Loan.—The Town Council has applied for sanction to a loan of £60,000 for mains, services, and transformers.

India.—Mandi Hydro-electric Scheme.—It is understood says *Indian Engineering*, that the Mandi Hydro-electric Scheme will, on completion of its first stage, supply energy for nineteen towns. This is one of the largest projects undertaken by the Punjab Government and is a purely official enterprise. Of the nineteen towns, three are in Indian States, and in these the local distribution will be done by State agency. Out of the remaining sixteen towns, there are only five which are at present supplied with electricity. Of these Lyallpur is supplied with power by the Hydro-electric Department, while Amritsar has entered into a contract for ten years to obtain all its requirements from the same department. This leaves only three towns in which Company licences exist. Though no licensees can be forced to take power from the Government, it is anticipated that the rates at which power can be offered for sale will be sufficiently attractive to induce them to purchase all their power from the Hydro-electric Department.

Kingston-on-Thames. — Plant Extension. — The Town Council has received sanction to a loan of £41,678 for the installation of additional plant at the electricity works.

Lincoln.—Water Shortage Difficulties.—Owing to the drought the Electricity Department is being faced with serious difficulties with regard to obtaining water for its generating station. The River Witham has fallen to such a degree that water has had to be pumped from a sewage farm. It is stated that if the river falls another two feet, the supply of electricity to local engineering works may have to be discontinued.

London —Fulham.—In connection with the proposed scheme estimated to cost £10,350 for improving the lighting of the main roads of the borough, the Electricity Committee has recommended the expenditure of £554 on an experimental system of central lighting in Harwood Road.

Hammersmith.—The Borough Council has agreed to accept a quotation from the London and Home Counties Joint Electricity Authority for a bulk supply of electricity to meet the whole

requirements of the Council's electricity undertaking, subject to satisfactory terms being arranged.

Hornsey.—The Borough Council Electricity Committee is seeking sanction to loans of £20,000 for general mains extensions and £10,000 for house services.

Lowestoft.—Loan Sanctioned.—The Corporation Electricity Committee has received sanction to a loan of £5,000 for the purchase of meters.

Bulk Supply.—At a meeting of the Corporation Electricity Committee held recently, the electrical engineer reported that the removal of the remainder of the steam plant at the electricity works had been carried out, and that it was expected to complete the installation of the two last convertors within the next few days. When the work has been completed the whole of the supply of electrical energy will be taken from Great Yarmouth. Arrangements have been made for the employés who will be discharged from the electricity works to be engaged at the artificial silk factory at the same rates of pay as they are now receiving.

Maidenhead.—Loan.—The Town Council has applied for sanction to a loan of £8,40[illegible] for mains extensions and substation equipment.

Maidstone.—Mains Extensions.—The Town Council is to carry out mains extensions in Linton Road at an estimated cost of £1,800, and to the village of Ditton at an estimated cost of £1,735.

New Mills.—Electricity Supply.—The Urban District Council has decided to carry out an electricity scheme for the district at an approximate cost of £27,000. The electrical energy will be supplied by the Trent Valley and High Peak Electricity Co., Ltd., who will purchase it in bulk from the Stockport Corporation.

Northern Ireland.—Antrim.—The ceremony of switching on the electricity supply was performed on Saturday, September 21st, by Mr. W. T. Cooper, chairman of the Antrim Town Commissioners.

Scarborough.—Loan.—The Corporation Electricity Committee has decided to apply for sanction to a loan of £40,000 for mains, services, and meters.

Sheffield.—Mains Extensions.—The Corporation Electric Supply Committee has approved an expenditure of £5,542 on mains extensions.

Sittingbourne and Milton Regis.—Electricity Charges.—The Kent Electric Power Co., which is laying mains in the two towns, has informed the Urban District Councils that the price of electricity will be 6½d. per kWh for lighting, and 2½d. per kWh for cooking.

South Africa.—Durban.—The statistics of the municipal electricity undertaking for the financial year ended July 31st last show that the electrical energy sold totalled 80,733,496 kWh, an increase of 15.5 per cent. as compared with the preceding year. Of the total sold the domestic heating and cooking load accounted for 27,544,572 kWh, which was an improvement of 32.2 per cent. as compared with 1927-28. During the year 1,339 cookers were installed, and although there was a slight decrease in the number of water heaters installed, the *South African Engineer* points out that this merely indicates that the "saturation" point is being approached in this respect. An increase of 72 per cent. took place in the number of electric refrigerators installed—260 as against 151 in the previous year. Since the inception of the hire-purchase scheme in 1925, approximately 3,000 agreements have been made with consumers.

Cape Town.—During 1928, the sales of electricity by the Corporation Electricity Department totalled 61,590,009 kWh, as compared with 55,131,999 kWh in 1927. Although the rate of increase was not so great as in previous years, this was due entirely to the inauguration in June, 1928, of the Salt River power station which took over the load of the South African Railways and Harbours Administration, amounting to 7,000,000 kWh, from the Corporation power station. The normal increase in consumption by private consumers, however, is such that the loss will be made up within 18 months.

Port Elizabeth.—The Corporation electricity undertaking is rapidly developing, the sales of electricity during 1928 amounting to approximately 12½ million kWh, as compared with less than 5½ million kWh in 1923, whilst the sales for 1929, based on the first seven months' working are estimated at 20½ million kWh. The increasing demand for electricity has been so great that it has not been possible to wait until the new 10,000-kW set is available and consequently a 3,000-kW set has been purchased from Durban Corporation as an emergency measure. The installation of this set is nearing completion and it will be put into commission shortly. Tenders have been received for the 10,000-kW turbo-alternator, steam-raising plant and auxiliaries.

Special Orders.—Application has been made to the Electricity Commissioners by the Old Silkstone Collieries, Ltd., for a Special Order authorising it to supply electricity in the urban districts of Holme Cultram and Wigton, in the rural districts of Alston-with-Garrigill, Bootle, Brampton, Longtown, Penrith and Wigton, and in a part of the rural district of Carlisle. Application has also been made to the Commissioners by the Newcastle-upon-Tyne Electric Supply Co., Ltd., to amend the draft Special Order so as to include in the area of supply the parish of Aydon Castle in the rural district of Hexham.

The Electricity Commissioners have submitted to the Ministry of Transport for confirmation a Special Order made by them authorising the Harrogate Corporation to supply electricity in the urban district of Knaresborough and in parts of the rural districts of Pateley Bridge and Great Ouseburn.

Sutton Coldfield.—Year's Working.—The accounts of the Corporation electricity undertaking (engineer: Mr. Thomas Bloore) for the year ended March 31st last show a total revenue of £35,594 and a working expenditure of £18,598, leaving a gross profit of £16,995. To the gross profit was added £298, being the balance from sale of fittings, making a total of £17,293 available, and after providing for capital and other charges there was a net surplus of £5,961. The capital expenditure during the year amounted to £10,794, the chief item of which was £4,402 for mains. The total capital expenditure to the end of the year was £162,694. The electrical energy sold increased from 2,122,291 to 2,552,196 kWh, and the maximum supply demanded from 1,494 to 1,971 kW.

Warrington.—Year's Working.—We have received from Mr. F. V. L. Mathias, borough electrical engineer, a copy of his report and a statement of accounts of the electricity undertaking for the year ended March 31st last. The total revenue increased from £133,771 to £134,301, and the working expenses fell from £79,488 to £77,315. The gross profit was £56,986, as compared with £54,284 in the preceding year, and to it was added interest on investments and bank interest, making a total of £58,612 available. From this the following charges had to be met: Interest on loans, £15,275; contribution to sinking fund, £14,387; income tax, £6,125; capital expenditure out of revenue, £4,362. There remained a net surplus of £18,464, as compared with £18,964 in 1927-28. The capital expenditure during the year amounted to £18,320, the principal item being £13,958 for mains and services. The total now spent on the undertaking stands at £565,996. The sales of electricity, excluding the tramway supply, increased from 20,327,260 to 22,838,857 kWh, and the maximum supply demanded from 9,600 to 10,200 kW. The average price obtained per kWh was 1.27d.

Wimbledon.—Water Heating Tariff.—At a recent meeting of the Corporation Electricity Committee, the borough electrical engineer outlined a scheme under which it would be possible to offer electricity at ½d. per kWh for water heating during the hours from 11 p.m. to 7 a.m., and reported that the adoption of this scheme would have the effect of considerably increasing the night load of the undertaking. The Committee authorised the electrical engineer to take the necessary steps to put the scheme into operation at the earliest date.

Loans.—The Corporation Electricity Committee is to apply for sanction to the borrowing of £30,000 for mains and services. The Committee has obtained sanction to loans of £15,000 for domestic apparatus to be let out on hire, and £2,500 for substation equipment.

Tramway and Railway Notes.

Bradford.—Railless Cars.—The substitution of railless cars for tramcars on the Allerton route is expected to take place towards the end of this month.

Chester.—Tramway Abandonment.—The Corporation has decided to abandon its tramway system in January next and to substitute motor-omnibuses.

Continental.—Sweden.—According to a Gothenburg paper, it is planned to electrify the private railway between Gothenburg and Boraas, which is 72 kilometres long.—*Reuter's Trade Service* (Stockholm).

East Ham.—Proposed Tramway Extension.—At a recent meeting of the Corporation Tramway Committee, the town clerk submitted a letter from the Ministry of Transport enclosing a copy of a letter received from the Metropolitan Municipal Tramways Council regarding the suggested extension of the tramway system from Barking, through Longbridge Road and Valence Avenue to Romford High Road, in order to serve the Becontree Estate. The letter stated that the Minister would be prepared to arrange a conference of representatives of the local authorities concerned for the purpose of a preliminary discussion of the proposal, and he would be glad to know whether the Corporation was willing to be represented. The Committee recommended the appointment of representatives to attend the conference on the Council's behalf.

Northern Ireland.—Belfast.—The Corporation Tramway Committee has decided to apply for sanction to run railless cars in the city.

Stockton.—Tramway Abandonment.—The Corporation has decided to abandon its tramway system and substitute 'buses. It is stated that £80,000 would have been required to renew the track on the Thornaby and Stockton section of the service.

The L.M. & S. Railway.—Carriage Lighting.—A scheme sanctioned by the Ministry of Transport for the development and modernisation of the London Midland and Scottish Railway includes the expenditure of £200,000 on the conversion of gas-lighted carriages to electric lighting

The Southern Railway.—Breakdown.—The failure of a rotary convertor at the Lewisham sub-station on Friday last, at 10.25 p.m., was the cause of a breakdown affecting the whole of the Southern Railway's suburban system. The lights at every station were extinguished, and the new electric signalling apparatus also failed. The service was resumed shortly before 11 p.m.

United States.—New York.—A fire, which broke out at the power station at the Grand Central Railway station shortly before 9 p.m. last Saturday, suspended throughout the night the traffic on the most congested northerly traffic routes out of the city. The Grand Central Railway station not only serves the northern suburbs of New York, but is also the terminus for the main line traffic to the principal towns in New England and for the international express lines to Canada. Electric power is used to propel these main-line trains from the station, a transfer to steam being effected outside the city.

Telegraph and Telephone Notes.

America.—Telephone Industry.—Figures recently published by the United States Census Bureau concerning the quinquennial census of telephones show that there were 18,522,767 telephones in use in the United States on December 31st, 1927, an increase of 29.1 per cent. since 1922. The number of telephones in every State increased, the largest increases being in Florida, 103.7 per cent.; California, 57.9 per cent.; Louisiana, 57.5 per cent.; and New Jersey, 56.3 per cent. In the same period the industry's investment in plant and equipment grew from $2,205,183,000 to $3,548,874,000, a gain of 60.9 per cent. The single wire mileage increased since 1922 by 71.3 per cent., amounting in 1927 to 63,836,182. The number of employés increased by only 20.3 per cent. since 1922, while the number of calls handled in 1927 showed an increase of 28.3 per cent. over 1922.

Code Telegrams.—New Rules.—In accordance with the decision of the International Telegraph Conference held at Brussels in September, 1928, new rules for the use of code words in telegrams for abroad came into force on October 1st and will operate on international telegraph routes, whether cable or wireless, throughout the world.

Egypt.—Radio-telephony.—The Egyptian Ministry of Communications has submitted for financial approval a scheme for a wireless telephone service from Egypt to England, with an extension to the Continent.

Empire Communication. — Transfer. — The Postmaster-General announced that on September 29th the working of the Imperial telegraph cables and of the beam wireless services to the Dominions and India (the telegraph systems known as "Imperial" and "Empiradio") were transferred from the Post Office to Imperial and International Communications, Limited, the company recently formed to take over (as recommended by the Imperial Wireless and Cable Conference of 1928) the services of the Post Office as well as the services of the Pacific Cable Board, the Eastern Telegraph Company, Ltd., and Marconi's Wireless Telegraph Co., Ltd. The overseas telephone services and the Anglo-Continental telegraph services operated by the Post Office are not affected by the change.

Radio Notes.

Egypt.—Broadcasting Scheme.—Several Powers have asked the Egyptian Government for a copy of the law on wireless in Egypt and the Government has replied that no legislation exists at present. A representative of the Marconi Co. has met the Minister of Communications to discuss a scheme for broadcasting in Egypt.

France.—Loud-speaker Curfew.—The mayor of the town of Chateldou, in the Auvergne district, has signed an order prohibiting the use of wireless installations provided with loud-speakers after 10 p.m. in summer and 9 p.m. in winter. The order followed complaints made by several inhabitants.

Germany.—Licences.—Dr. Wagemann, president of the Institute for Trade Situation Research, recently told the Society for German Economic Propaganda that in Germany in 1928 users' licences yielded 55,000,000 marks, and the number of subscribers amounted to about 3,000,000. That considerable growth of the number of wireless subscribers in Germany was probably shown by a comparison with other countries: thus, in the United States he stated that in 1928 there were 8.4 wireless sets to every 100 inhabitants; in Sweden, 6.1 per 100; in England, 5.5 per 100; and in Germany, only 3.9 per 100. The exports from Germany last year, valued at 50,000,000 marks, were considered to be remarkably high, being almost as much as in the United States, and about twice the value of the English exports. The German industry was said to be confronted with the problem of the extension of markets; lack of working capital hampered the industry, rendered difficult the promotion of sales by the grant of credits, especially to foreign customers, and it involved the danger of German undertakings passing under foreign control.

Licences.—Prosecutions.—During the past four years 3,230 prosecutions have been undertaken by the British Post Office authorities under the Wireless Telegraphy Acts.

Regional Station.—Brookman's Park Tests.—The B.B.C.'s new London regional transmitter at Brookman's Park is now radiating the last section of the London programme each night, excluding Sundays, commencing on September 30th, which portion of the programme is the late dance music, lasting for about 1¼ hours and terminating at midnight. The test transmissions which have been radiated from Brookman's Park between midnight and 1 a.m. since September 16th ceased after the night of September 28th-29th; but the morning transmissions between 11.30 and noon will be continued for the present. No test transmissions will be radiated from Brookman's Park on Sundays.

Switzerland.—Regional Stations.—Following Britain and Poland, the Swiss service is to be reorganised. The country has two exclusive wave-lengths only. For the German-speaking portion of the country a station is to be erected at Münster, twelve miles north-west of Lucerne, near Lake Sempach. It will use the 459-metre wave and have 25 kW aerial power, with provision for increasing it to 50 kW. It will be fed from studios at Berne, Zürich, and Basle, and be relayed by the Tessin station. For the French-speaking part of the country a station will be built at Sottens, near Mondon, north-east of Lausanne. It will operate on the 403 metre wave and be of 12.5 kW power, capable of being increased to 25 kW. It will be fed by studios at Geneva and Lausanne, and relayed by the Geneva local plant, which will be of 1 kW and use the 680 metre wave; it will be situated on a height called St. Georges down the River Rhone. By September, 1930, this first part of the reorganisation scheme, for which credit has been voted, should be complete. About six months later a 3-kW, 760-metre station will be opened on Monte Cenere, midway between Lugano, Locarno, and Bellinzone, in Tessin Canton, to serve the Italian-speaking part of the country. When the actual radius of each of the new stations has been proved, the Swiss Administration will consider the putting into practice of the second part of the scheme, namely, the erection of local stations in Berne, Basle, St. Gallen, and perhaps Zürich, of one kilowatt on a common wave. The third and last part of the scheme would be the erection of two 1-kW stations in the Valley at Sion and in the Grisons at Chur; this, however, will be done only if it is found that these stations are absolutely necessary. The Swiss Telegraph Department will erect and operate the stations, says *World Radio*, and in consideration will retain a slightly larger proportion of the licence fees than hitherto. The programmes will be furnished by two companies, and the stations will be interconnected.

Autumn Illuminations at Blackpool.

The Blackpool illumination season is now in full swing, and every evening until October 21st the four miles of promenade will be lit up at dusk. Approximately £9,000 has been spent by the Corporation Electricity Department on planning and executing the lighting scheme, and it is computed that the Corporation's share of the illuminations is at least 100,000 electric lamps of many colours. This year the extent of the illuminations is greater than in preceding years owing to the proprietors of the three piers having decided to illuminate their properties independently. Each structure is outlined with white lamps, and the minarets are flooded. Four 50-kW generators have been put in commission to deliver electricity from the overhead traction wires. The suply is drawn from the local power station, assisted by the bulk supply which is taken from Preston. The town hall in Talbot Square is the principal centre of the illuminations, and this building alone displays about 6,000 lamps. The illumination of the town hall each evening is the signal for all the other buildings and the numerous other decorative features to be switched on. In Talbot Square a score of tall illuminated pylons carry festoons of coloured lamps, and in front of the town hall there are moving set-pieces of waterfalls, fountains of light, rising and setting suns, stars, &c. All the electric lamp standards along the promenade are enclosed in decorative lanterns. The tramway stops are distinguished by pillars of light, and even the kiosks are decorated with 420 lamps each. Twenty toast-rack tramcars each carry 100 lamps, an illuminated tramcar 4,000 lamps, and an illuminated windmill 3,000 lamps. A number of motor flashers is used to work the various moving devices. Facilities were provided by the Corporation Electricity Committee for householders, shopkeepers, hotel proprietors, and others to acquire lighting units, lamps, and strip wiring, &c., on loan from the department at extremely modest rates.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Argentina.—Buenos Aires.—November 4th. Argentine State Railways. Turbo-generator sets and headlights for locomotives. (B.X. 5657.)*

Australia. — Melbourne. — State Electricity Commission. December 16th. Oscillograph equipment. (B.X. 5692.)*

Posts and Telegraphs Department. November 12th. Telephone receivers and parts. (B.X. 5656.)* Transmitters and parts. (B.X. 5653.)*

November 19th. Telephone generators and motor-generators. (B.X. 5662.)*

November 19th. Motor-generators. (B.X. 5694.)*

November 26th. Vitreous resistances. (B.X. 5696.)*

November 27th. City Council. 6,600 3-phase switchgear. (B.X. 5708.)*

Sydney.—October 29th. New South Wales Government Railways. Railway traction motor-testing equipment. (B.X. 5693.)*

Belfast.—October 21st. Electricity Department. Supply and delivery of circulating water pipes. (See this issue.)

Brighton.—October 11th. Corporation. Supply of gasfilled lamps for street lighting purposes for a period of one year from November 1st next. (See this issue.)

Cardiff.—October 21st. Electricity Department. Supply and erection of a water-tube boiler, mechanical stokers, and fuel economiser. (See this issue.)

Edinburgh.—October 7th. Education Authority. Electric lighting and heating installation at Portobello Secondary School. Schedules, &c., from Mr. J. A. Carfrae, architect, 3, Queen Street, Edinburgh.

Egypt.—Cairo.—November 5th. Department of Public Health. Electric refrigerators for 12 months.—*Reuter's Trade Service* (Cairo).

Glasgow.—October 8th. Tramways Department. Water-tube boiler plant, one 10,000-kW turbo-alternator with condensing plant and auxiliaries, and e.h.p. switchgear and control gear for Pinkston power station. (September 20th.)

Halifax.—October 7th. Waterworks Committee. Electrician's work in connection with the erection of filter house, &c. Particulars from Mr. A. C. Tipple, borough engineer (deposit £2 2s.).

Hastings.—October 23rd. Electricity Department. 22,000 V, 3-phase overhead lines and underground cables, Crowhurst Section, No. 6 (approximately 7,000 yards.) 400 V 3-phase, 4-wire overhead lines and underground cable, Crowhurst Section, No. 7 (approximately 4,200 yards.) 400 V, 3-phase, 4-wire, overhead lines and underground cable, Whatlington Road, Section No. 8 (approximately 1,000 yards.) (See this issue.)

India.—October 11th. South Indian Railway Co., Ltd., Madras. Electrification of suburban services, overhead contact and distribution lines. (September 13th.)

Delhi.—December 3rd. India Stores Department. Ceiling and table fans. (B.X. 5672.)*

London.—Great Western Railway.—October 8th. Supply from November 1st of telegraph instruments, electrical apparatus (insulators), &c., electric wires and cables, and electric lamps. (September 20th.)

Southwark.—October 22nd. Borough Council. Electric cables for 12 months. (September 13th.)

Central Electricity Board.—November 9th. Supply, delivery, and erection of 33,000-V overhead transmission lines in South Lincolnshire. (September 27th.)

Manchester.—October 10th. Education Committee. Electric lighting installation at Birchfields Municipal School, Rusholme, and North Manchester High School for Boys, Moston. Specification (deposit £1 1s.) from Education Offices, Deansgate.

October 23rd. Electricity Committee. Supply, delivery and erection of four 33,000-V, 500,000-kVA rupturing capacity switch units, and two 10,000-kVA, 33,000/6,600-V indoor-type transformers. (See this issue.)

Morocco.—Tetuan.—October 10th. Public Telegraph Service. Telegraph posts, insulated copper wire, insulators, g.i. supports, and copper binding wire. (B.X. 5706.)*

New Zealand.—Wellington.—Post and Telegraph Department. November 12th. Four-conductor operator cords. (B.X. 5685.)*

October 8th. Indicator alarm fuses. (B.X. 5714.)*

Public Works Department. November 12th. 15-kW oil-engine-driven generating set for installation on the "Main Pomare." (B.X. 5683.)*

Auckland.—Auckland Electric Power Board. November 4th. Distribution pillar shells and link units and cable sealing ends. (B.X. 5682.)*

Sidmouth.—October 7th. Supply, delivery, and laying and erection of l.p. paper-insulated feeders and additional overhead l.p. mains. (September 27th.)

Sleaford.—October 10th. Electricity Department. Supply and erection of one slate control panel with s.p. breaker, switch, &c. (September 27th.)

Southend-on-Sea. — Electricity Department. Supply of 1,500 current limiters. (September 20th.)

Electric Lighting Department. Supply of 2,000 pairs of house service fuse boxes. (September 27th.)

South Africa.—Johannesburg.—October 17th. Municipal Council. Supply of tramcar motors. (B.X. 5664.)*

Salisbury.—October 17th. Municipal Council. H.p. cables, transformers, &c. (B.X. 5604.)*

Turbo-alternators, steam piping, crane and switchgear. (B.X. 5607.)*

Staffordshire.—October 31st. Education Committee. Installation of electric light in two new elementary schools in course of erection at Brierley Hill. (September 27th.)

Wakefield.—October 15th. West Riding Education Committee. Installation of electric light at Thurlstone new schools. Particulars from the Education Officer, County Hall, Wakefield.

Ysceifog (Holywell).—October 12th. Installation of electric light at St. Mary's Church. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Barking Town.—Electricity Committee.

Supply of cable in connection with supply to Becontree, from Upney to Gale Street :—

Ateliers de Constructions Electriques de Charleroi. (Recommended.)	£1,809
Power & Lighting Cables, Ltd.	1,953
Enfield Cable Works, Ltd.	2,035
W. T. Glover & Co., Ltd.	2,066
Callender's Cable & Construction Co., Ltd. ...	2,071
Hackbridge Cable Co., Ltd.	2,075
Pirelli-General Cable Works, Ltd.	2,075
Siemens Bros., & Co., Ltd.	2,096
Union Cable Co., Ltd.	2,101
Standard Telephones & Cables, Ltd.	2,109
Johnson & Phillips, Ltd.	2,116
W. T. Henley's Telegraph Works Co., Ltd. ...	2,120

Two truck type cubicles for Upney sub-station (£176), and two for works of Messrs. Warne & Co. (£176).—New Switchgear Co., Ltd. (accepted).

Supplying and laying cable from Axe Street to sewage works :—

Siemens Bros. & Co., Ltd. (Recommended) ...	£2,779
Callender's Cable & Construction Co.	2,851
Standard Telephones & Cables, Ltd.	2,872
W. T. Henley's Telegraph Works Co., Ltd. ...	2,876
Johnson & Phillips, Ltd.	2,884
Enfield Cable Co., Ltd.	2,919

3,300 yd. of cable for lighting the by-pass road.—Siemens Bros. & Co., Ltd.

Bedford.—Electricity Committee. Accepted :—

Overhead line to Ridgmont (£498) and overhead line to Lidlington (£355).—Robert M. Russell.

Recommended :—

Six-wire overhead line to Wootton Pillinge (£2,843).—Pirelli-General Cable Works, Ltd.

Birmingham.—

Electrical installation at Quinton Hall.—Walker & Co.

Brighton.—Electricity Committee. Recommended :—

H.p. switchgear (£650).—A. Reyrolle & Co., Ltd.

Two 300-kVA transformers (£400).—Ferranti, Ltd.

Canterbury.—Board of Guardians.

Mr. G. E. Dashwood has been appointed as electrician to the institution for a period of six months.

Dublin.—County Borough Commissioners. Accepted :—
Motors, automatic starters, and starting switches in connection with the equipment of the municipal abattoir at the North Circular Road (£447).—North British Lifting and Moving Appliance Co., Ltd.
Electrically-driven automatically controlled pumps, with fittings and auxiliary machinery at three pumping stations (£3,635).—Mather & Platt, Ltd.
—Irish Builder and Engineer.

Epsom.—The Board of Guardians. Accepted :—
Installing electric light in a portion of the Institution, including the boardroom, chapel, dining hall, and kitchen (£114).—Alpha Manufacturing Co., Ltd.

Halifax.—Tramways Committee.
Phono electric trolley wire.—Equipment and Engineering Co., Ltd.

Ilford.—Electricity Committee. Accepted :—
Two kiosks, complete with 300-kVA transformer, h. and l.p. switchgear (£749); one 165-kVA transformer to replace 100-kVA ditto in kiosk (£104); two steel cubicles (£118).—Crompton Parkinson, Ltd.

Kettering.—Electricity Department. Accepted :—
E.h.p. lead-covered armoured cable (£866).—Union Cable Co., Ltd.

London.—Shoreditch.—Board of Guardians :—
Six months' supply of electrical goods.—Metro-Vick Supplies.

Maidenhead.—Town Council. Accepted :—
Rectifier plant for a sub-station (£1,231).—Hewittic Electric Co., Ltd. E.h.p. switchgear.—Drake & Gorham (Wholesale), Ltd.

Rugby.—Urban Council. Accepted :—
Cable, &c., for the Barby Road extension (£1,068).—W. T. Henley's Telegraph Works Co., Ltd.

Southend-on-Sea.—Town Council. Accepted :—
Copper trolley wire (£409).—Union Cable Co.
H.d. copper trolley wire (£242).—British Insulated Cables.
36 medium and 6 heavy traction poles for tramways (£376). British Mannesman Tube Co., Ltd.
Motor for sewage pumping station (£246).—General Electric Co., Ltd.
Rectifiers for adapting eliminator units to a.c. supply (£2 2s. 7d. each for 100 to 250).—E. K. Cole, Ltd.

Staffordshire.—
Electrical installation for the extension to the North Staffordshire Technical College (£466).—C. Ramsay and Co. (S. Shields).

Stoke-on-Trent.—Electricity Committee. Accepted :—
Four superheaters for water tube boilers at central power house (£1,243).—Stirling Boiler Co., Ltd.
Two economisers (£5,262).—E. Green & Son, Ltd.

Walton-on-Thames.—Urban Council. Accepted :—
Various cable.—Pirelli-General Cable Works, Ltd.
300 yd. of .0145 service cable.—Croydon Cable Works, Ltd.
Standard feeder pillar.—Lucy, Ltd.

West Ham.—Borough Education Committee. Accepted :—
Installing electric light in the extension of Plaistow secondary school (£570).—Harland & Wolff, Ltd. The highest tender was £1,185.

Forthcoming Events.

Exhibition of Inventions.—October 2nd-12th. Central Hall, Westminster, S.W.

Institution of Welding Engineers.—Thursday, October 3rd. Caxton Hall, S.W. 7.30 p.m. Lecture on "Impressions of American Industries including Welding." Mr. E. A. Atkins.

Diesel Engine Users' Association.—Friday, October 4th, Caxton Hall, Westminster, S.W. 6 p.m. "Indicating Oil Engines." Mr. G. B. Fox.

Salford Technical and Engineering Association.—Saturday, October 5th. Royal Technical College, Salford. 7 p.m. "An Automatic Electric Sub-Station." Mr. A. E. Clarke.

Illuminating Engineering Society.—Tuesday, October 8th. Lighting Service Bureau, 15, Savoy Street, W.C. 6.30 p.m. Report on Progress in Illuminating Engineering.

Institute of Marine Engineers.—Tuesday, October 8th. The Institute, 1, Minories. 6.30 p.m. "Electric Propulsion as applied to Passenger Liners." Mr. E. Berg.

Institute of Wireless Technology.—Wednesday, October 9th. Engineers' Club. 7 p.m. Annual General Meeting.

Nottingham Society of Engineers.—Friday, October 11th. Mechanics' Institution, Nottingham. 7.30 p.m. Annual General Meeting.

Electrical Power Engineers' Association (North-West Midland Section).—Friday, October 11th. Engineering and Scientific Club, Wolverhampton. "A.c. Meters." Mr. R. J. Rennie.

Institution of Engineering Inspection.—Friday, October 11th. Royal Society of Arts, John Street, Adelphi, W.C., 5.30 p.m. "The Chemical Laboratory in Inspection," Mr. E. F. Law.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following :—

Texa automatic fuses.

Notes.

Smoke Abatement.

The Coal Smoke Abatement Society and the Smoke Abatement League of Great Britain are holding a conference at the Palace Hotel, Buxton, from October 4th to 6th. One of the papers to be read will deal with "The Industrial Uses of Electricity and their Development," while the Conference will see the birth of a new national organisation for combating smoke. The League has in the past confined its attention mainly to the provinces, while the Society has worked chiefly in London. The fusion of the two will greatly strengthen the growing movement against smoke, and the new body, the name of which will be chosen at Buxton, will have its central offices in Manchester, and will also have offices in London and Glasgow. One of the first steps will be the publication of a periodical dealing with the subject, to be entitled "Clean Air," and of which the first number will be issued in November, at the time of the important Manchester Smoke Abatement Exhibition.

Illuminating Engineering Society.

The following series of ordinary meetings have been arranged for the 1929-30 Session :—October 8th : Opening Meeting; November 8th : "Modern Incandescent Lighting in Kinema Studios," Messrs. W. H. Villiers and S. G. Double; December 10th : "Nature and Effects of Glare," Mr. W. S. Stiles; January 21st : "Stage Lighting," Mr. H. C. Ridge; February 18th : Discussion on "Problems in Illuminating Engineering"; March 18th : Paper on "The Lighting of a large Liner"; April 8th : "Textile Lighting," Mr. S. Anderson; May 6th : "Luminous Traffic Signals," Mr. T. Austin.

Appointments Vacant.

Meter repairer and meter tester for the Hull Corporation Electricity Department; resident assistant engineer for the Brentwood Mental Hospital; mains superintendent (salary, Class F, Grade 3) for the County Borough of Blackburn; commercial assistant for Nuneaton Corporation Electricity Department; borough electrical engineer and manager (£1,000), for Wolverhampton Corporation; sub-station fitter, for Stockport Corporation. (See our advertisement pages to-day.)

The Electrical Association for Women.

The 1929 autumn and winter London fixtures of the Electrical Association for Women include : October 10th, visit to Kelvinator, Ltd., and lecture on "Electrical cold that keeps," by Mr. F. E. Kewley; November 7th, visit to Messrs. Shoolbred, Ltd., and lecture by Mr. W. J. Jones, M.Sc., on "Electric light and eyesight preservation"; November 27th, lecture by Mr. E. E. Sharp on "Some electrical experiences in Australia"; December 11th, visit to Messrs. Berry's Electric, Ltd.; and a lecture-demonstration on "Electric Christmas cooking," by Mrs. A. Mole; December 20th, display of kinematograph films arranged by the British Electrical Development Association.

On October 2nd, the Manchester and Salford branch of the Association will inaugurate its winter programme with a "Bring and Buy Sale" which will be held in the Electricity Showrooms of the Salford Corporation. On October 16th the branch will hold a luncheon at the Midland Hotel when the principal speakers will be the Lady Mayoress of Manchester, Lady Emmott, J.P., Lady Brooks, J.P., and Miss Hazlett.

Model Agreement for Wayleaves.

The Times (September 23rd) states that a conference of representatives of the Central Landowners' Association, the Land Agents' Society, and the Surveyors' Institution, has prepared a draft model agreement for the use of landowners granting wayleaves for the passage of electric lines across their property. This agreement, which, with an explanatory memorandum, is printed in the September issue of the *Journal* of the Central Landowners' Association, has been accepted by the Central Electricity Board, and can, it is thought, be adopted in most cases. The conference has also drawn up a scale of wayleave rentals, which ranges, according to the voltage of the lines and the character of the poles, from £2 per steel tower for 60,000-volt lines down to 1s. per leg or stay for woodon poles in hedgerows and on moorland and waste ground for lines carrying up to 12,000 volts. The suggested rentals do not cover compensation for damage or loss of amenity.

Manchester Electro-Harmonic Society.

The Manchester Electro-Harmonic Society has completed arrangements for the eleventh season, and, as hitherto, a series of smoking concerts will be held at intervals of a month, commencing with October 18th.

Birmingham Electric Club.

The programme of meeting for the 1929-30 session includes the following:—

October 18th.—Ladies' night.
October 25th.—"Motor Users and the Frequency Change," Mr. T. A. Windebank.
November 22nd.—"Dust Explosions," Mr. J. D. Morgan.
December 30th.—Annual meeting.
January 24th, 1930.—Presidential address
February 28th.—"Electric Propulsion of Ships," Mr. W. J. Belsey.
March 14th.—Annual dinner.
March 28th.—"The Principles Underlying Television," Mr. J. B. Kramer.
April 25th.—"Pulverised Fuel," Mr. F. Forrest.

The Electrical Power Engineers' Association.

The Manchester Section of the E.P.E.A. is holding a social evening and dance at the Cheetham Town Hall on Saturday, October 12th. Tickets (2s. 6d. each) can be obtained from the Manchester office of the Association, Mr. Killeen, 269, Rochdale Road, Bury, or from members of the Sectional Committee.

Gyro Compass Invention Awards.

The Royal Commission on Awards to Inventors has published its decision in the matter of the Harrison & Rawlings liquid level control as applied to the Sperry gyro compass. The claimants were Sir James B. Henderson, D.Sc., Mr. S. G. Brown, F.R.S., Mr. A. L. Rawlings, Ph.D., and Mr. E. Kilburn Scott. The Commission awards Sir James Henderson £1,000 in respect of his claim for the floating ballastic and modified ballistic devices used in the solid bail type of Sperry gyro compass. As regards a second claim by Sir James, this was considered in conjunction with the claims of Mr. Brown and Dr. Rawlings. The Commission is satisfied that the use in substitution for the solid bail of a liquid level to obtain the necessary gravitational control of the compass originated partly from an examination of the compass submitted to the Compass Department by Mr. Brown, and partly from the suggestions made to the Admiralty by Sir James Henderson. The device actually adopted by the Admiralty was developed by Dr. Rawlings and another officer of the Compass Department, but as Dr. Rawlings had already received a grant and permission to dispose of the commercial rights of the device, and in view of his position in the Compass Department at the time, no award is recommended. It is proposed that Sir James Henderson and Mr. Brown should be awarded £5,000 each to cover all past, present, and future use of the compass. It is considered that the device put forward by Mr. Kilburn Scott contributed nothing to the compass in question, and no recommendation is made.

According to the *Brown Marine Gazette*, Mr. S. G. Brown declines to accept the award, as he claims to have invented the principle of the liquid level control independently and without assistance. He also considers that the amount awarded is altogether inadequate. He states that by acquainting the Admiralty of his principle he has suffered serious financial loss.

Ljungström Turbines.

Although the largest Ljungström steam turbine to run at a speed of 3,000 r.p.m. so far constructed is that recently completed for the power station at Leghorn, Italy, of the Società Ligure Toscana di Elettricita, the Svenska Turbinfabricks Aktiebolag Ljungström, of Stockholm, is now constructing a 27,000-kW turbo-generator set to run at that speed and is engaged on the design of sets of 30,000 and 40,000 kW capacity.

Traffic Control Signals.

The Ministry of Transport has issued a memorandum on traffic control by light signals, based on experience in America and other countries where such signals have been in use for many years. It has been drawn up after consultation with a conference of chief officers of police representing most of the cities and towns in this country wherein traffic light signals have been brought into operation. It is desirable, says the memorandum, that the signals in use in different parts of the country, their operation and siting, should be, as nearly as may be, uniform. An increase in the safety of the streets for vehicles and pedestrians and easier and more regular flow of traffic, with consequent reduction of congestion and delay, can be secured by the use of automatic traffic signals, but the unnecessary and indiscriminate installation of such signals is to be deprecated. For the best results the traffic should be as nearly uniform as possible. Where there is a high percentage of horse-drawn vehicles it may be difficult to secure effective operation, and in such cases signals should be installed, if at all, only after careful investigation. It is recommended that three colours should be displayed vertically at each signal. The relative positions of the colours should be:—At the top, red; in the middle, amber; at the bottom, green. The purpose of the amber light is to give warning to drivers and pedestrians of the impending change from red to green. Red means "stop"; red and amber together mean "prepare to start when green is shown"; and green gives permission to move. The red lens should bear the word "stop" and the green one the word "go." White lines should be laid on the roadway to indicate the points at which vehicles are to stop when red is shown. The use of a bell to sound at the changes in the colours of the lights may be of service where the traffic is dense and includes a large proportion of large and high vehicles, such as double-deck omnibuses, and where there is therefore a possibility of one or more of the signals not being observed. The cycle length of the signals is an important matter. In general, short cycles are to be preferred to long ones, and for the control of ordinary traffic a cycle length of from 40 to 80 seconds is recommended; cycles of this length enable the maximum flow of traffic to be maintained. Pedestrians should be encouraged to cross the carriage-way under the care of the signals and at the points where such signals are erected, and at none other.

The Opposition to 132-kV Lines on the South Downs.

In a statement published in the *Daily Telegraph* of October 1st, the opposition to the proposed 132-kV lines on the South Downs is criticised as follows:—

The Central Board has paid special attention to the preservation of local amenities in the Lake District and the South Downs, and it has had the assistance of leading architects and authorities on landscape design. The Board was under obligation to bring electricity to the most remote districts in the country, and it has been impossible to avoid the erection of transmission lines in the Lake District and over the South Downs, the only alternative in the latter case being the complete omission of the South Coast towns from the national scheme. The Central Board has carried out lengthy negotiations in the Lake District and the South Downs with local authorities, county councils, associations representing special interests, societies for the preservation of rural beauty and other local amenities, but a point has now been reached at which no further concession can be made if the national scheme is to function at all. These negotiations and conferences have already occupied the greater part of this year, and they have encouraged innumerable parties of local authorities and local interests in their determination to carry out a policy of complete obstruction. It is only necessary to study developments in world-famous beauty spots on the Continent to discover that overhead main transmission can be in itself a thing of beauty, and can be designed to fit in with the most magnificent landscape.

The result of the delay incurred during such conferences must be serious, both for those great industries that are dependent on cheap power for improvement in their competitive efficiency, and for those industries which are already engaged in carrying out contracts in connection with the national scheme. The opposition, therefore, has got beyond the stage at which the desire to preserve local amenities is the one motive. It runs the risk of holding up the national scheme indefinitely and of increasing unemployment. It is surely time that an investigation were held, not merely into the origin of such demands and complaints, but also into the constitution and functions of the bodies and even of the individuals moving behind the opposition.

Owing to technical conditions, the cost of underground cables is not less than ten times that of overhead, and in some cases as much as thirty times; the resultant cost to the country, measured in terms of new capital, would be colossal, and the *régime* of cheap power would be indefinitely postponed.

The Batti-Wallahs' Society.

The first Batti-Wallahs' Society luncheon of the 1929-30 session was held at the Hotel Cecil on Tuesday last. Mr. George Balfour, M.P., was the principal guest, and delivered a brief address upon the position of the electricity supply industry of this country. He refused to acknowledge that Great Britain lagged behind the United States in electrical development, and maintained that it was absolutely unjust to compare two countries in which conditions were so widely different. In the latter part of last century we led the world in electricity supply, but we were already more "civilised" than the United States, and there was less scope for development. Again, electricity had to compete with an efficient and well-established gas industry, whereas large parts of the United States were virgin soil. In the earlier part of this century development was retarded by the cheapness of coal for steam raising. Electricity could not compete with manufacturers' small steam plant. When the war broke out practically every supply undertaking in the country had out inquiries for turbine plant, and the war held up development in that direction. By capturing the remunerative populous centres, the municipalities had robbed the large power companies of the means of building up economic systems with mains radiating into rural districts. Dealing with the legislation which had been concerned with the industry, Mr. Balfour said that the curious ideas regarding national reconstruction had culminated in the 1919 Electricity (Supply) Act. He and his friends had strenuously opposed

that measure and had managed to kill the most vicious principles which it contained as a Bill. He stressed the fact that a cheap and abundant supply of electricity was not to be obtained by reducing production costs. It was the cost of distribution and the load factor which mainly determined the price; local rates added a great deal to the cost. The speaker said that there was a great deal of misapprehension regarding electricity prices, and he asked the members of the Society to go forth as missionaries to dispel the existing ignorance and thus render the industry a good service. Mr. Balfour also made reference to the Scottish hydro-electric schemes with which he was concerned, and particularly mentioned the 15¼-mile tunnel that had been bored in connection with the Lochaber scheme, which he described as one of the greatest pieces of modern engineering.

The Professional Classes Aid Council.

The annual report of the Council for the year ended April 30th last states that there was a further increase in the number of applications for relief, the total being 920, as compared with 780 in 1928. Financial assistance was given to 183 families, and 362 inquirers were advised where to apply for help, in addition to many whose needs did not bring them within the scope of the Council. A gift of £650 was received from former pupils of Halliwick School, which will be used to give pensions or grants to distressed gentlwomen. The amount spent on education was £2,589, and 71 children were assisted. Training has been assisted in 29 cases, £582 being spent in this way, in addition to £204 in maintenance grants given during training.

The total income was £10,341, and the expenditure £8,818, leaving a balance of £1,523. The address of the hon. treasurer (Hon. George Colville) is 251, Brompton Road, S.W.3.

The Shannon Scheme.

In the area of the Irish Free State to which electricity from the Shannon hydro-electric scheme will be supplied, the equivalent of from 65 to 80 million kWh per annum is at present being used. In making this statment in a recent address to the Cork Rotary Club, Dr. T. A. McLaughlin, managing director of the Electricity Supply Board, said that the figure should settle once and for all the assertion that the Shannon would provide more electricity than the country could use. The consumption of electricity in the Free State in 1928 was 67 million kWh, and the figure on which the experts based the economy of the Shannon scheme was 110 million kWh. From the figures quoted it was quite obvious that the market possibilities far exceeded 110 million kWh.

Institution Notes.

The Institute of Metals.

Winter Session Activities.—The Institute of Metals has just issued its programme for the coming session. This includes over 40 meetings to be held in metallurgical centres throughout England, Scotland and Wales. The programmes of the various local sections have been drawn up to meet the needs of local industries. The subjects dealt with are of an essentially practical character, and include papers on "Metals in Aircraft Construction"; "Metal Melting by Electricity"; "Chromium Plating"; "Some Difficulties in Aluminium Alloy Founding and Some Remedies"; "Electric Heat-Treatment Furnaces"; and "The Effect of Some Impurities in Copper." Copies of the programmes can be obtained on application to the Secretary, Mr. G. Shaw Scott, M.Sc., 36, Victoria Street, London, S.W.1.

Institution of Electrical Engineers.

Informal Meetings.—The following is the programme of discussions at informal meetings during the new session:—

October 28.—"Systematic Research by Industrial Undertakings" (opened by the President, Colonel Sir T. F. Purves, O.B.E.).

November 4th.—"Paris and the Pyrenees: Notes on some of the Technical Features of the I.E.E. 1929 Visit" (opened by Mr. R. Borlase Matthews).

November 11th.—"Temporary Expedients in Engineering" (opened by Mr. W. E. Highfield).

November 25th.—"Wooden Poles for Overhead Transmission Lines and their Preservation" (opened by Mr. C. Wade).

December 9th.—"To Earth or not to Earth" (opened by Mr. W. R. Rawlings and Mr. T. C. Gilbert).

1930.

January 13th.—"Efficiency" (opened by Mr. A. Morgan).

January 27th.—"High Tension Distribution" (opened by Mr. G. V. Twiss).

February 3rd.—"Maintenance of Telephone Plant" (opened by Mr. H. G. S. Peck).

March 3rd.—"Push-Button Control" (opened by Mr. J. J. Fisher).

March 17th.—"High Tension Sub-station Control Gear" (opened by Mr. A. F. Harmer).

March 31st.—"Loud-speakers" (opened by Captain P. P. Eckersley).

April 14th.—"Telephone Exchange Practice in Germany and Scandinavia" (opened by Mr. A. B. Eason).

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. Edward Ernest Hoadley, borough electrical engineer at Maidstone, was married at St. Paul's Church, Maidstone, on September 17th, to Miss Helena Nora Smith, youngest daughter of Mr. W. Raymond Smith, of Springfield Avenue, Maidstone. The presents included a silver tea pot from the Corporation Electricity Committee, and a silver sugar bowl and cream jug to match from the staff of the Electricity Supply Department.

Mr. W. Ibeson, charge engineer, at the Longroyd Bridge electricity works, Huddersfield, has secured a position at the Widnes Technical Institute, and the Town Council has appointed Mr. E. B. Haigh as his successor.

According to *Modern Transport*, Mr. T. B. Goodyer, O.B.E., who recently resigned from the managership of Croydon Corporation tramways, has been appointed municipal sales manager of Tilling-Stevens Motors, Ltd., Maidstone.

Croydon Corporation Tramways Committee recommends that Mr. G. V. Stanley, acting tramway manager, be now appointed tramway manager at a salary of £600 per annum.

It is reported that Mr. J. B. Parker, general manager and engineer of the Tees-side Railless Traction Board, has been appointed general manager to the Aldershot and District Traction Co. at £1,200 a year.

Mr. B. A. Martin Cooper, for six years mains superintendent at Blackburn electricity works, has been appointed chief assistant engineer at Worcester under Mr. C. M. Shaw, M.I.E.E. Mr. Cooper received his training at the City and Guilds Engineering College at Kensington, and later he was with the Bournemouth Corporation tramways and Bournemouth & Poole Electric Supply Co. He has also had experience with the Newcastle Electric Supply Co., the Yorkshire Electric Power Co., and Messrs. Johnson & Phillips, Ltd.

The Electricity Committee of the Newark Town Council, on September 24th, considered 158 applications for the post of borough electrical engineer, and selected Mr. William Brown, B.Sc., A.M.I.E.E., mains superintendent of the Borough of Morecambe and Heysham, and Mr. Robert E. Liversley, B.Sc., A.M.I.E.E., chief electrical assistant, Aylesbury Corporation, to be interviewed by the committee, and the full Council later. The salary is £400 per annum, rising by £25 yearly to £500.

Mr. C. C. Rattey, M.I.E.E., chairman of the Alton Battery Co., Ltd., left in the *Berengaria* on September 28th *en route* for the United States, Canada and the Far East. He will return about the end of February next *via* the Straits Settlements, Ceylon and India. The Alton Battery Co., Ltd., intends to establish branch offices and depôts wherever trading conditions warrant. Mr. W. R. Montgomery, a director, and the manager of the company, will be in control of its interests during Mr. Rattey's absence.

Mr. J. R. Barrett has joined the sales staff of the Horstmann Gear Co., Ltd., and will represent that company in the Midlands.

Alderman H. R. Nuttall, Chairman of Burnley Electricity Committee for many years, has been selected as Mayor for next year.

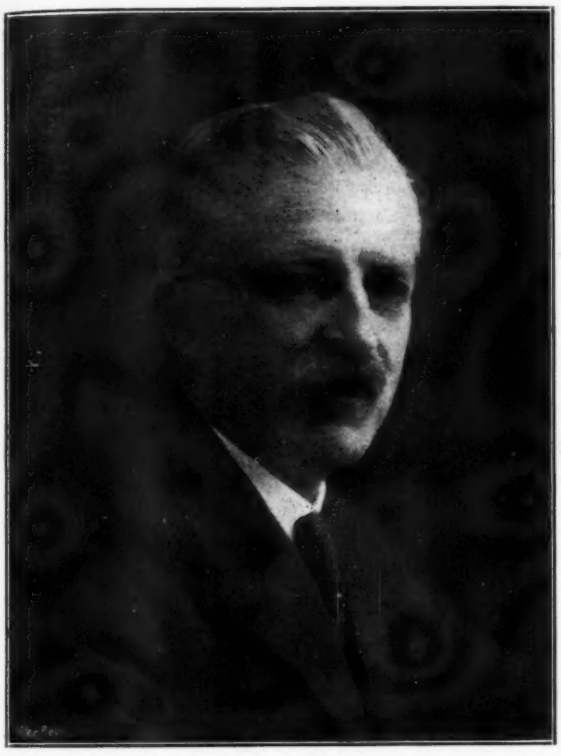
Barking U.D.C. Electricity Committee has appointed Mr. A. B. Catling, mains superintendent, Eccles, as mains superintendent, and Mr. P. R. Stracey, sub-station attendant, Gosport and Fareham Tramway Co., as sub-station attendant.

Mr. S. B. Donkin has accepted the office of President of the Association of Supervising Electrical Engineers for a further term. He will deliver his presidential address on October 15th.

Mr. H. W. Edwards, who was engineer to the Oswestry Electricity Company's undertaking, has been appointed borough electrical engineer to the Oswestry Town Council, which has decided to take over the company.

Mr. C. McKinlay recently left Metro-Vick Supplies to take up an appointment as representative for Messrs. Lane and Girvan, Ltd., for the sale of "Caledonia" electric heating and cooking appliances in England, Wales, and Ireland. On September 20th an interesting ceremony took place at the general offices (Charing Cross Road) of Metro-Vick Supplies, when Mr. McKinlay was presented by Mr. P. F. Crinks (general manager), on behalf of Mr. McKinlay's friends in the organisation, with an inscribed gold watch.

We reproduce herewith a portrait of Mr. R. G. WARD, who has just relinquished the position of chairman of the Sheffield Sub-Centre of the Institution of Electrical Engineers. Mr. Ward was educated at Towcester and at the Cardiff University and received his early electrical and mechanical training with the Cardiff Dowlas Co. From there he went to Messrs. John Brown & Co., Ltd., Sheffield, as electrical engineer and is now



Elliott & Fry] *[London.*

Mr. R. G. Ward,

Immediate Past-Chairman of the Sheffield Sub-Centre of the I.E.E.

chief electrical engineer to that company. Mr. Ward represented the I.E.E. at the Royal Sanitary Institution held in Sheffield during July.

As reported last week, Mr. R. BIRKETT has retired from the position of borough electrical engineer of Southend. In consequence of his continued ill-health, Mr. Birkett had asked the Electric Lighting Committee to consider the question of his retirement. This was done, and it was reported that he had done 32 years' service (24 years in Southend), which counted for superannuation purposes. The committee was of opinion that the allowance should be calculated at the rate of one-eightieth for each year of service instead of one-one hundred-and-twentieth, which was the minimum allowed by statute. The effect of this would be to make the allowance £600 per annum, £400 of which would fall upon the Superannuation Fund and £200 upon the electricity undertaking. These recommendations were carried without comment.

Mr. F. E. SMITH, C.B., C.B.E., D.Sc., F.R.S., Director of Scientific Research at the Admiralty, has been appointed by His Majesty the King in Council to be Secretary to the Committee of the Privy Council for Scientific and Industrial Research, with effect from October 1st, 1929, on the resignation of Mr. H. T. Tizard, C.B., F.R.S.

The members of the Blackpool Athenæum Club are combining to make a gift to their president, Mr. CHARLES FURNESS, Blackpool's electrical engineer and tramway manager, whose marriage will take place shortly. Mr. Furness was a founder of the club, and has been the driving force behind its activities ever since.

The Guildford Town Council has appointed Mr. W. F. MAY, assistant mains superintendent, as mains superintendent at a salary of £250 per annum, rising to £300.

Mr. T. W. DOUGLAS, assistant superintendent of the Telegraph Department at Cork, has retired after a period of 45 years' service.

At a recent meeting of the Barking Town U.D.C. it was reported that Mr. HOLMES, the electrical engineer, was still absent owing to illness, and that Mr. W. E. KIDNER, acting electrical engineer, was in charge.

Mr. F. W. PURSE reminds us that he left West Ham on October 1st. His address is now the London and Home Counties Joint Electricity Authority, 5, Millbank, S.W.1.

Mr. S. A. KNIGHT, B.Sc., A.C.G.I., has left the Metropolitan-Vickers Electrical Co., Ltd., to join the Harland Engineering Co., Ltd., Alloa, and is shortly proceeding to Calcutta to take charge of the Harland interests in India. His Calcutta address will be P.O. Box 189.

Manchester Corporation Electricity Committee has appointed Mr. S. A. RUSSELL, A.M.I.E.E. as resident engineer, Barton power station.

Croydon Electricity Committee recommends that Mr. HOSKING, now assistant power station superintendent, be designated Engineering Assistant to the Borough Electrical Engineer, and that Mr. HOCKLEY, the senior charge engineer, be appointed generating engineer.

Obituary.—MRS. BRAGG.—The whole of our readers will, we feel sure, associate themselves with us in an expression of deep sympathy with Sir William Bragg on the death of his wife, which occurred on Sunday last.

MR. G. J. ALDERMAN.—The death took place on September 25th, at the age of 73 years, of Mr. George James Alderman, who was for many years in business as an electrician in Minster Street, Winchester, of which city he was a native. Since his retirement about five years ago the business has been conducted by Shiner & Cooper.

Wills.—The late Mr. ROBERT GRUNDY BROOKE, managing director of Holden & Brooke, Ltd., left £57,408 net and £60,379 gross personalty.

LORD MONTAGU OF BEAULIEU, chairman of Edison Accumulators, Ltd., and other companies, left unsettled estate of £56,224 gross and £47,846 net.

Mr. C. T. BRISCOE, of Blackpool (chairman of C. T. Briscoe and Sons), left £4,275 gross and £1,272 net personalty.

Mr. W. S. TOPLIS, of Marylebone, electrical engineer, left £14,276 net and £14,841 gross personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Fred. W. Wood, Ltd.—Private company. Registered September 24th. Capital, £1,500 in £1 shares. Objects:—To carry on the business of wireless engineers, manufacturers and dealers, gramophone manufacturers and dealers, dealers in apparatus for reception and transmission of pictures, and television, &c. The first directors are:—F. W. Wood, 122, Farebrother Street, Grimsby, wireless engineer; S. F. Jennison, 4, Dudley Street, Grimsby, fish merchant; D. C. Lazenby, 9, Grosvenor Crescent, Grimsby, C.A.; A. P. Pearson, 46, Anston Avenue, Worksop, stores manager. Secretary: D. C. Lazenby. Registered office: 24a, Bull Ring, Grimsby.

Portables, Ltd.—Private company. Registered September 25th. Capital, £100 in 1s. shares. Objects:—To carry on the business of manufacturers, importers and exporters of, and dealers in all kinds of portable and other gramophone, wireless, kinematograph, electrical, mechanical, musical, talking and sound producing, receiving, transmitting, and recording instruments, &c. The subscribers (each with 100 shares) are: L. F. Chapman, 11, Queen Victoria Street, E.C.4, merchant tailor; W. F. Crol, 1, Museum Street, W.C.1, company director; W. E. Adolph, 5, Brickhill Lane, E.C.4, wine merchant. The first directors are to be appointed by the subscribers. Solicitor: H. P. Crowe, 3, Staple Inn, Holborn, W.C.

Leroy & Richardson, Ltd.—Private company. Registered September 26th. Capital, £3,500 in £1 shares. Objects:—To carry on business as wireless and electrical engineers, manufacturers, contractors and repairers, dealers in wireless, electrical and photographic instruments and fittings, loud-speakers, valves, accumulators, television instruments and apparatus, &c. The directors are:—L. Leroy, "The Gable End" Library, Seaford, music and book seller; J. S. Richardson, 170, High Street, Lewes, radio engineer. Secretary: J. S. Richardson. Registered office: 170, High Street, Lewes.

Bridges-Bower, Ltd.—Private company. Registered September 24th. Capital, £500 in £1 shares. Objects:—To carry on the business of radio and electrical engineers, manufacturers of, and dealers in electrical apparatus, machines, instruments, accessories and goods, &c. The subscribers (each with one share) are:—E. E. W. de Becker, engineer, and Dorothy King, 16, Old Quebec Street, W.1. E. E. W. de Becker is the first permanent director. Registered office: 77, New Oxford Street, W.C.1.

Norwood Radio, Ltd.—Private company. Registered September 25th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of manufacturers of, and dealers in wireless and electrical apparatus and accessories, musical instruments and goods, &c. The directors are:—P. S. Matthewman, 5, Grange Gardens, South Norwood Hill, S.E. (director, Matthewman & Hagland, Ltd.); F. G. W. Chidsey, 24, Knights Hill, West Norwood, S.E.27. Registered office: 28, Budge Row, E.C.4.

Super Relay Service, Ltd.—Private company. Registered September 26th. Capital, £250 in 5s. shares. Objects:—To construct and maintain wireless signal stations and all other stations for the reception and distribution of radio signals or waves, and to carry on the business of consulting wireless experts, manufacturers of, and dealers in all kinds of wireless appliances, &c. The directors are:—W. T. Kempton, Forehill, Ely; R. G. Houghton, Market Place, Ely. Registered office: 2a, Forehill, Ely.

Kew Engineering Co., Ltd.—Private company. Registered September 20th. Capital, £15,000 in £1 shares. Objects:—To adopt an agreement with the Cowey Engineering Co., Ltd., and L. E. Cowey, and to carry on the business of manufacturers and constructors of, and dealers in substances, articles and apparatus for use in connection with the transmission, emission or reception of sound, pictures, light, heat and power, &c. The subscribers (each with one share) are:—J. G. A. Bickford, 73, Southwold Mansions, Maida Vale, W.9; R. D. Pond, 14, Queen Victoria Street, E.C.4, clerks. The first directors are to be appointed by the subscribers. Solicitors: Gilbert, Clarke & Gilbert, 14, Queen Victoria Street, E.C.4.

Rose & Partridge, Ltd.—Private company. Registered September 23rd. Capital, £1,000 in £1 shares. Objects:—To acquire (1) the business of electrical engineers and dealers in electrical novelties and merchants now carried on by A. H. Rose at 6, South Street, E.C., as Rose Bros.; and (2) the business of an electrical engineer and dealer in electrical novelties now carried on by S. Partridge at 43a, Barbican, E.C., as "S. Partridge," and to carry on the business of manufacturers of, and dealers in electric batteries, lamps, torches, accumulators, instruments and novelties, wireless installations, loud-speakers, &c. The directors are:—A. H. Rose (chairman), 6, South Street, E.C.2; S. Partridge (managing director), 43a, Barbican, E.C.1. Registered office: 6, South Street, E.C.2.

Scottish Mica Co., Ltd.—Private company. Registered in Edinburgh on September 20th. Capital, £100 in £1 shares. Objects:—To carry on the business of mica and mineral importers, merchants, agents, &c. The subscribers (each with one share) are:—J. H. Wallace, writer; E. D. Leggett, clerk, both of 150, St. Vincent Street, Glasgow. Registered office: 209, West George Street, Glasgow, C.2.

Honeycomb Batteries, Ltd.—Private company. Registered September 27th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers, electricians, manufacturers of and dealers in electric cells, &c. The subscribers (each with one share) are: R. H. Brown, 10, Coverdale Road, W.12, accumulator specialist; P. H. A. Martin, 12, Annandale Road, Chiswick, W.4, storage battery engineer. The directors are: R. H. Brown and others to be appointed by the subscribers.

R. G. Heaton & Co., Ltd.—Private company. Registered September 28th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical and radio engineer heretofore carried on by R. G. Heaton at 108, Alexandra Road, Moss Side, Manchester. The directors are: R. G. Heaton, 108, Alexandra Road, Moss Side, Manchester; B. Heaton, 39, King Edward Road, Moseley, Birmingham; Mrs. Ivy B. M. Choularton, 28, Norton Street, Old Trafford, Manchester (all permanent, subject to each holding 10 shares). The said R. G. Heaton shall be permanent managing director so long as he holds 100 shares, with £250 per annum as remuneration. Registered office: 108, Alexandra Road, Moss Side, Manchester.

Official Returns of Electrical Companies.

Yorkshire Traction Co., Ltd. (formerly Barnsley and District Traction Co., Ltd.).—Capital, £200,000 in 50,000 preference and 150,000 ordinary shares of £1 each. Return dated May 9th, 1929. 22,350 preference and 109,505 ordinary shares taken up. £109,820 paid on 22,350 preference and 87,470 ordinary shares. £22,035 considered as paid on 22,035 ordinary shares. Mortgages and charges: £19,928 4½ per cent. debenture stock; £29,000 second debentures issued to bankers as collateral security. Returns of allotments, made up to July 25th, 1929, show a further 38,495 ordinary shares allotted, payable in cash, and fully called up; and 2,000 preference and 2,000 ordinary shares allotted as fully paid as part payment for purchase of omnibuses.

Vickers, Ltd.—Capital, £26,500,000 in 54,000,000 ordinary shares of 6s. 8d. each, 7,000,000 5 per cent. cumulative preference shares, and 750,000 5 per cent. preference shares of £1 each and £750,000 preferred 5 per cent. stock. Return dated April 8th, 1929. 12,315,483 ordinary, 6,863,807 cumulative preference, and 750,000 preference shares and £750,000 preferred stock issued and fully paid up. Mortgages and charges: £1,250,000 5 per cent. first mortgage debenture stock; £2,000,000 5½ per cent. debenture stock, and £55,388 on houses and land at Barrow.

China and Japan Telephone and Electric Co., Ltd.—Capital, £75,000 in £1 shares. Return dated May 28th, 1929. 39,761 shares taken up. £25,000 paid. £14,761 considered as paid. Mortgages and charges, nil.

W. H. Allen, Sons & Co., Ltd.—Capital, £500,000 in £1 shares. Return dated July 15th, 1929. 408,750 shares taken up. £58,757 paid. £349,993 considered as paid. Mortgages and charges, £149,000.

Ilfracombe Electric Light and Power Co., Ltd.—Capital, £50,000 in £5 shares. Return dated June 11th, 1929. 7,000 shares taken up. £35,000 paid. Mortgages and charges, nil.

Newmarket Electric Light Co., Ltd.—Capital, £30,000 in £10 shares. Return dated April 5th, 1929. 2,656 shares taken up. £26,560 paid. Mortgages and charges, £14,200.

Hampshire Light Railways (Electric) Co., Ltd.—Capital, £1,000 in £10 shares. Return dated May 29th, 1929. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Willans & Robinson, Ltd.—Capital, £173,165 5s. in £30,000 "A" preference stock and £141,665 5s. "B" preference stock, and 30,000 ordinary shares of 1s. each. Return dated April 29th, 1929. All shares and stock taken up. £142,431 10s. paid on £30,000 "A" stock, £110,931 10s. "B" stock, and 30,000 ordinary shares. £30,733 15s. considered as paid on £30,733 15s. "B" stock. Mortgages and charges, £116,740.

Llangollen and District Electric Light and Power Co., Ltd.—Satisfaction in full on September 14th, 1929, of debenture dated March 7th, 1911, securing £300.

Norfolk Engineering Co., Ltd.—F. Heywood, 16, Cambridge Street, Sheffield, ceased to act as receiver and manager on September 20th, 1929.

Cark & District Electricity Co., Ltd.—Particulars filed of £1,000 debentures authorised August 13th, 1929, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

La Plata Electric Tramways Co., Ltd.—Capital, £450,000 in 200,000 preference and 250,000 ordinary shares of £1 each. Return dated May 22nd, 1929. All shares taken up. £170,007 paid on 170,007 preference shares. £279,993 considered as paid on 29,993 preference and 250,000 ordinary shares. Mortgages and charges, £90,200.

Summit Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated March 18th (filed July 26th), 1929. All shares taken up. £100 paid. Mortgages and charges, nil.

City Notes.

Folkestone Electricity Supply Co., Ltd.

It was announced this week that the County of London Electric Supply Co., Ltd., had made an offer to purchase the company's ordinary share capital, amounting to £175,000.

The directors stated that the terms of the offer would be contained in a circular which would be issued to shareholders, and the acceptance of the offer would be recommended.

Babcock & Wilcox, Ltd.

The directors recommend a dividend of 7 per cent., free of tax, on the ordinary capital in respect of the half-year ended June 30th.

Stock Exchange Notices.

Dealings in the following have been allowed by the Committee under Rule 159:—

Crompton Parkinson, Ltd.—200,000 new ordinary shares of 5s. each, issued at 10s. per share, fully paid, Nos. 450,001 to 650,000.

Underground Electric Railways of London.—5,741 ordinary shares of £1 each, fully paid, Nos. 7,224,312 to 7,230,052.

The undermentioned have been ordered to be officially quoted:—

Underground Electric Railways Co. of London, Ltd.—1,865 ordinary shares of £1 each fully-paid, Nos. 7,222,447 to 7,224,311.

The Cable and Wireless Merger.

Cables and Wireless, Ltd., announces that the certificates of "assents" deposited at the close of business on September 25th were as follows:—Eastern Telegraph Co., Ltd., 97.86 per cent.; Eastern Extension, Australasia and China Telegraph Co., Ltd., 98.02 per cent.; Western Telegraph Co., Ltd., 98.15 per cent.; and Marconi's Wireless Telegraph Co., Ltd., 92.14 per cent. The 92.14 per cent. of the shares in Marconi's Wireless Telegraph Co. assented represents 89.5 of its nominal issued capital. Assents are still coming in. The company points out that to secure the benefit provided under the Act for the relief from capital duty, amounting to approximately £40,000, it is necessary to obtain assents for 90 per cent. of the issued capital. For this purpose, only an additional £10,962 in Marconi shares is now required to be assented.

Official Notice *re* Companies.

The names of the undermentioned companies will be struck off the Register at the expiration of three months, unless cause is shown to the contrary:—

B. Morris (Electrical Radio), Ltd.
Deansgate Electro Radio (Manchester), Ltd.
Dur-a Electric Lamps, Ltd.
Electric Bulk, Ltd.
Everose Electrical Co., Ltd.
Garker Electrical Manufacturing Co., Ltd.
Heath's Auto Electrical Co., Ltd.
P. F. Brittain, Ltd.

Philips' Glowlamp Works.

The *Financial Times* says that the issue is announced of £1,300,000 ordinary shares at 250 per cent. and £440,000 cumulative preference shares at 130 per cent. in Philips' Glowlamp Works to holders in the proportion of three old to one new. The new shares are entitled to a quarter of the 1929 dividend. This will bring the capital up to £5,200,000 ordinary and £1,770,000 cumulative preference shares.

Falkirk Iron Co., Ltd.

After meeting debenture interest and interest on employés' share deposits, the profit for the year ended March 31st last was £972 (against £16,701). A balance of £32,931 brought forward is added, and it is proposed to carry forward the whole amount (£33,904). Last year a dividend of 6 per cent. was paid.

Ransome & Marles Bearing Co., Ltd.

From the profit of £66,788 for the year ended June 30th last the directors propose to pay a dividend of 8 per cent., less tax, on the ordinary shares, and transfer £7,577 to reserve, leaving £27,211 to be carried forward.

Associated Fire Alarms, Ltd.

A dividend of 8 per cent. is recommended on the ordinary shares for the year ended June 30th last. A similar dividend was paid for 1927-28.

Electrical Finance and Securities Co., Ltd.

An interim dividend of 4 per cent. has been declared on the ordinary shares (as last year).

West London and Provincial Electric and General Trust, Ltd.

An interim dividend of 4½ per cent. has been declared.

German Companies.

The *United Electrotechnical Works Co.* (*Busch & Jaeger*), Ludenscheid, proposes to pay a dividend of 5 per cent, out of net profits of 200,000 marks for 1928-29.

The *Rheydt Cable Works Co.*, Rheydt, states that activity in 1928-29 was satisfactory. The net profits increased from 1,020,000 marks in 1926-7 to 1,060,000 marks last year, the dividend remaining at 12 per cent.

The *Electricity Company* (*late Lahmeyer & Co.*), Frankfort-on-Main, records an increase in net profits from 2,032,000 marks to 2,440,000 marks in 1928-29. The dividend is raised from 10 to 12 per cent.

The *German Electricity Works Co.* (*Garbe, Lahmeyer and Co.*), Aix-la-Chapelle, reports that the gross profit increased from 2,419,000 marks in 1926-27 to 2,657,000 marks last year, while the net profit rose from 262,000 to 284,000 marks. After making various appropriations, a balance of 34,000 marks has been carried forward.

Stocks and Shares.

Tuesday Evening.

The long-threatened rise in the Bank Rate took place on the Thursday in last week, when the 5½ per cent. that had been in force since February was raised by 1 per cent. The immediate effect was comparatively innocuous, so widely had the possibility been discounted in advance. A heavy tendency spread throughout gilt-edged securities, but the falls were trifling, and had it not been for the fear that a still further advance may be necessary in order to check the drain of gold and to re-establish the exchanges, it is possible that no unfavourable effects would have been produced upon prices. As, however, the fear does undoubtedly persist in regard to a yet further rise in the Rate, this has the effect of weighing down quotations for investment stocks and shares, and of accentuating the depression caused in a good many markets by the collapse of what has come to be known as the Hatry group.

This collapse has had effects that stretch far beyond the immediate circle of companies involved. The action of the Stock Exchange Committee in withdrawing permission to deal in the shares and stock of the Hatry group came immediately after heavy falls in the prices of those particular issues. The Stock Exchange Committee took prompt action, and postponed settlement of the bargains that had been done for the end-September account until October 24th. The uncertainty which remains acts, however, as a strong restraint upon confidence and enterprise. Nobody quite knows who will be hit by the débâcle. It is well known that strong institutions may prove to be amongst the heaviest losers; and, if so, the burden will fall upon shoulders able to carry it. Other and smaller people can hardly hope, however, to escape. It remains to be seen to what extent the ramifications of the trouble will proceed. This uncertainty, combined as it was with the rise in the Bank Rate, led to prices of stock and shares all round the markets being weakened by the prevailing atmosphere.

Dollar Stocks.

Although heavy falls occurred in a great number of American industrial securities, the prices of shares in the utility Companies have been remarkably well held. It might have been supposed that speculative counters, such as Brazilian Tractions and Hydro-Electrics, would have been amongst the first to give way under the pressure of the difficulties, but in point of fact, Hydro-Electrics, though the price dipped to 82, rallied promptly to 83¼. After that it dived to 79½, leaving a fall, on the week, of 4¼. International Holdings, which are still regarded as the stable companion of Hydro-Electrics, are lower at 10½. The American telephone group is surprisingly steady, considering the very substantial rise which has lately occurred in the prices of the stocks. American Telephone and Telegraph, at 302, shows a nominal fall of 8 points, of which, however, the dividend deducted from the price on September 27th accounts for a couple of points. International Telephones at 130 are 10 lower. The dividend was taken off in this case also, though the amount of ½ per cent. was negligible. Mexico Tramways at 56 are unchanged; Puebla Tramways rose 2½ to 20.

American Utilities.

In the power group, Shawinigan Water, at 106, is 2 up. Power Corporation of Canada, at 126½, has gained the fraction; Montreal Light, Heat & Power shares of no par value are 174½, showing a gain of no less than 16, not to mention the dividend of 4 points that was deducted from the price last Pay Day. Movements such as these do not suggest that the American buyers of Utility shares have taken serious fright at the monetary tightness on this side, or at the effects of the Hatry group collapse. Considerable sums of money, it may be mentioned without breaking confidence, have recently been put into American utilities by important British insurance companies, whose aim is similar to that of the Americans themselves; namely, capital appreciation rather than a desire to obtain good yield, for the time being.

British and American Views.

One of the reasons why British investors are reluctant to take a hand in the American market, and have, as a whole, declined to follow the bulls in New York, is the difference of angle of view adopted by our people and by the Americans. Clients on this side look to see what dividends a company is paying, and what is the yield to be obtained by a purchase of shares. If the return is something small, the client, as likely as not, will decline to have anything to do with it; hence the refusal of British investors to participate to any wide extent in the American market activity. On the other side of the water, the standpoint is that an investor must disregard the yield that shares offer at the present time; the essential thing to observe is the profit-earning capacity of a company. This can be seen in such shares as Metropolitan Electric, where, at the present price of 46s. 3d., the return is under 4 per cent. on the money, on the basis of the usual 9 per cent. dividend paid by the company. The British investor argues this yield is not enough; but the American, maintaing that in the company there resides room for expansion of profit-earning capacity, continues to

buy the shares. There are many better illustrations which can be chosen, but Metropolitan Electric is one that comes randomly to mind.

The Folkestone Company Acquired.

Rumours lately current as to a possible purchase of the Folkestone Electric Lighting Company, crystallised into fact in the early part of this week. The news was contained in a letter, sent by hand to the Stock Exchange, from the County of London Electric Lighting Company, stating that the latter had bought the Folkestone Electric, the shareholders in which would be well advised not to part with (*sic*) their shares. The purchase is to be effected on the basis of an exchange of shares. Taking the price of County ordinary at 57s. 6d., the Folkestone shares will work out, roughly speaking, in the near neighbourhood of 70s., and proprietors will no doubt be very satisfied with the manner in which the negotiations have been concluded.. The price of Folkestone, which stood at 50s. a week ago, has risen to 56s. 3d. County ordinary are, if anything, a little lower at 57s. 6d. sellers. The 6 per cent. preference shares, like those of the North Metropolitan Electric sixes, are easier at 22s. 6d., by reason of the rise in Bank Rate. North Metropolitan ordinary hold their previous gain, being firm at 57s. 3d., Metropolitan ordinary continue somewhat dull at 46s. 3d. Slight falls reduced Egham and Staines to 37s., and Northamptons to 47s. 9d. Midland Electric Power shares have lost 1/16th, at 35s. Bournemouth and Poole, at 64s. 6d., are 1s. 9d. lower. Shropshires fell back to a guinea.

The disposition of the market in electricity supply shares is heavy, and the situation derives no benefit from the rapid drawing-in of the daylight, or the fact that clocks go back an hour at two a.m. next Sunday morning. Much money has to be provided against claims due to the substantial depreciation incurred by reason of Bank Rate rise and the Hatry group fall. The liquidation is marked in stocks and shares that remain readily saleable, as electricity supply shares are; it is not every market which can find buyers of shares even at reduced prices. No better evidence can be produced of the confidence that electricity shares command, than the relative firmness, as compared with the weakness elsewhere, shown by the prices quoted in our own list.

Equipment and Manufacturing.

Still more striking, perhaps, is the fact that prices of various shares in the manufacturing division should have further advanced, after a considerable rise previously, in the face of all-round depression elsewhere. British Insulated ordinary regained the deducted dividend of 1s. per share, and added 1/16 as well, to their price. Enfields followed up their sharp advance with a fresh improvement of ½, this making the price 5½. British Aluminium, at 50s. 9d. ex dividend, are virtually unchanged. Henley's eased off to 6⅝. A fall of 5s. lowered Associated Electrical Industries to 37s. 6d., and General Electrics gave way to 52s. 6d. English Electric ordinary and preference fail to recover the losses sustained a week ago, and Crompton Parkinsons are flat at 20s.

Home Railway Weakness.

Further falls have taken place in the market for Home Railway stocks, the only issue to escape the general heaviness being Central London ordinary assented stock, which remained at 71. Underground income bonds have shed four points to 105, and the shares gave way to 22s. Metropolitans lost a point; Districts fell 10s. These falls, in view of the de-rating reliefs, which came into force on Tuesday of this week, are disappointing, and are due partly to the closing of stale bull accounts, partly to the need for raising money required to finance other obligations. Amongst traction issues, British Electric Tractions deferred ordinary, at 1,600, is 25 points lower, and the preferred ordinary stock shed 6½, falling to 121½.

Foreign Traction.

Anglo-Argentine Tramways first and second preference are flat at 3½. Remarkable fluctuations occurred in Brazilian Tractions, the price jumping to 77, on Monday evening, and subsiding to 72 in the street on the following night. The preferred shares are better at 240. Mexican Light and Power common shares rose 9 to 126½, and the 7 per cent. preferred, at 80½, are 4 up. British Columbia 5 per cent. preference, at 86½, has given way 2 points. San Paulo Electric 5 per cent. bonds fell to 86½, and Vancouver Power 4¼ per cent. debenture to 76½. Atlas shares are lower at 27s.

Further Falls in Cable Stocks.

Cables and Wireless B ordinary stock, at 57½, is 5 points down on the week, and 42½ lower as compared with the price reached less than three months ago. The 7½ per cent. A ordinary stock is 2 down, at 82½, and the 5½ per cent. preference, quoted at 92½, is ex a quarter's dividend. The market has subsided into a condition of weakness, in which every sale, however small, exercises a disproportionate effect upon the prices. Marconi Marines have dropped to 2⅜. The iron and steel section is dull, in sympathy with other industrial descriptions. A fall in rubber to 9¾d. per lb. served to accentuate the depression that had been previously ascribed to mild liquidation amongst some of the leading shares.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom.	Approx. Dividend. 1927.	1928.	Price Oct. 1 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	64/6	—1/3	4 13 0
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	8¾	25/-	—	5 12 0
City of London	1	10	10	32/-	—	4 7 6
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	36/3	—	... ...
County of London	1	7	10	57/6	—	3 9 9
do. do. 6% Pref.	1	6	6	22/6	—6d.	5 6 8
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	52/-xd	—	4 4 8
Kensington Ordinary	1	8	8	26/-	—	5 7 8
Lancs. Light and Power	1	7½	7½	28/-	—6d.	5 7 2
London Electric	1	8½	9	27/6	—	5 1 10
Metropolitan	1	9	9	46/3	—	3 17 3
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	34/6	—	3 15 4
Mid. Elec. Power	1	15	8	35/-	—1/16	4 11 5
Newcastle-on-Tyne Ordinary	1	6	6	26/3xd	—	4 11 5
do. 7% Pref.	1	7	7	25/6xd	—	5 9 10
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	22/6	—6d.	5 6 8
St. James' and Pall Mall	1	8	8	26/6	—	5 5 8
Scottish Power	1	8	8	31/6	—	5 1 7
South London	1	8½	8½	26/6xd	—	5 5 8
Urban Ordinary	1	7	7	38/3	—	3 13 6
Westminster Ordinary	1	8½	8½	25/6	—	5 9 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/9xd	—6d.	6 6 4
Yorkshire Elec.	1	8	8	26/6	—	4 7 8

Home Rails.

Central London Ord. Assented	Stock	4	4	71	—	5 12 8
Metropolitan	"	8	8½	58½	—1	5 19 8
do. District	"	4	5	71½	—½	6 19 10
Underground Electric	£1	5	7	29/-	—1/-	6 7 3
do. do. Income	Bonds	6	6	105	—4	5 14 3

Telegraphs and Telephones.

Anglo-Am. Tel. Pref.	Stock	6	6	108	—	5 16 6
do. Def.	"	1½	1½	24½	—	6 4 5
Automatic Telephone	1	10	12½	37/6xd	—6d.	6 13 4
Cables & Wireless 5½ Pref.	Stock	—	—	92½xd	—	5 19 0
do. A 7½ Ord.	"	—	—	83½	—2	... ...
do. B Ord.	"	—	—	57½	—5	... ...
Globe Tel. and T. Ord.	10	10	10	25xd	—	*3 18 6
do. do. Pref.	10	6	6	10½xd	—	5 9 1
Great Northern Tel.	10	20	17½	31	—	5 13 0
Indo-European	25	10	10	47½	—	*5 5 3
Marconi-Marine	1	12½	15	2⅞	—⅛	5 9 2
Oriental Telephone Ord	1	12	12	8	—	... ...

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref.	5	5½	5½	8½	—5/16	8 16 0
do. do. 2nd Pref.	5	6	6	8½	—¼	9 12 0
do. do. 5% Deb.	Stock	5	5	75	—	6 13 4
British Electric Traction Def. Ord.	"	5	5	1000	—25	... ...
do. do. Pref. Ord.	"	8	8	121½	—6½	6 11 9
Brazil Traction	100	7	8	72	—	2 15 7
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	86½	—2	5 15 7
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/-	—	... ...
London United Tram Deb.	Stock	4	4	51⅛	—	7 15 4
Mexico Trams, 5% Bonds	—	5	5	75½	—	6 12 5
Mexican Light Common	100	Nil	Nil	126½	+9	... ...
do. 7% Pref.	100	7	7	80½	—4	8 8 8
do. 1st Bonds	—	5	5	78	—	6 12 5
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	—	1⅞	—¼	3 4 0
Babcock & Wilcox	1	13	15	65/-	—	*4 12 4
British Aluminium Ord.	1	10	10	50/9xd	—	*3 18 9
British Elec. Transformer Pref.	1	7	7	18/-	—	... ...
British Insulated Ord.	1	15	15	4½xd	+2/-	3 14 0
Brush Ord.	Stock	10	10	190	—	7 13 10
Callenders	1	15	15	4	—	3 15 0
do. 6½% Pref.	1	6½	6½	1½	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	1	—6/6	... ...
do. 8% Pref.	1	8	—	25/-xd	+3/8	6 9 5
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	7 1 2
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	7½	6½	15/-	—	7 6 8
Enfield Cable Ord.	1	20	20	5⅛	+⅛	3 18 0
English Electric	1	Nil	Nil	8/3	—	... ...
do. do. Pref.	1	3	Nil	8/9	—	... ...
Gen. Elec. Pref.	1	6½	6½	24/-	—	5 8 4
do. Ord.	1	10	10	2⅝	—5/8	3 16 2
Henley	1	25	30	6⅝	—1/8	4 10 8
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	12/6	—	... ...
Johnson & Phillips	1	10	—	2	—	5 0 0
Siemens Ord.	1	7½	7½	28/9	—	5 4 4
Telegraph Construction	19	10	10	28	—	5 4 2

* Dividends paid free of Income Tax.

Italian Foreign Electrical Trade.

Imports and Exports in 1927 and 1928.

THE following statement, showing the imports into and exports from Italy of electrical goods during 1928 has been complied from the recently-issued official trade statistics. The figures for 1927 are added for purposes of comparison and notes of any increases or decreases are made :—

Imports.

	1927. Quintals.	1928. Quintals.	Inc. or dec. Quintals.
Electric generators and motors—			
Total	22,000	26,400	+4,400
From Austria	900	500	− 400
„ Germany	7,500	9,600	+2,100
„ Great Britain ...	700	400	− 300
„ Switzerland	2,600	2,200	− 400
„ Hungary	2,000	3,100	+1,100
„ United States ...	1,900	900	−1,000
Static transformers—			
Total	4,500	3,400	−1,100
From Austria	200	100	− 100
„ Germany	2,000	1,000	−1,000
„ Germany (Reparation account)	500	10	− 490
„ United States ...	20	60	+ 40
Electricity meters—			
Total	3,400	2,800	− 600
From Germany	3,000	2,600	− 400
„ Switzerland	200	50	− 150
**Telegraph and telephone apparatus*—			
Total	6,400	8,900	+2,500
From Germany	3,200	3,400	+ 200
„ Germany (Reparation account)	30	330	+ 300
„ United States ...	400	980	+ 580
„ Belgium	900	740	− 160
Carbons, electric—			
Total	32,000	37,000	+5,000
From Germany	18,000	24,000	+6,000
„ Jugo-Slavia	1,000	—	−1,000
„ United States ...	11,000	10,600	− 400
Insulators, porcelain, &c.—			
Total	5,800	4,200	−1,600
From Germany	2,600	1,400	−1,200
„ United States ...	—	50	+ 50
„ France	2,400	2,060	− 340
Accumulators—			
Total	850	2,100	+1,250
Other electrical apparatus and parts—			
Total	16,000	25,000	+9,000
From France	3,300	3,500	+ 200
„ Germany	7,200	8,600	+1,400
„ Germany (Reparation account)	400	730	+ 330
„ Switzerland	1,300	1,500	+ 200
„ United States ...	1,000	1,700	+ 700
„ Great Britain ...	1,000	6,000	+5,000
Electric lamps—			
Total (thousands) ...	14,200	19,300	+5,100
From Austria	1,800	1,700	− 100
„ Germany	4,666	6,300	+1,634
„ Holland	6,019	9,700	+3,681
„ Switzerland	187	430	+ 243
„ Hungary	1,347	704	− 643
Insulated electric wire or cable, covered with rubber or textiles	2,000	1,700	− 300
Ditto, armoured, including submarine cables	4,000	2,900	−1,100

Exports.

	1927. Quintals.	1928. Quintals.	Inc. or dec. Quintals.
†Insulated electric wire or cable, covered with rubber or textiles	3,700	3,900	+ 200
†Ditto, armoured, including submarine cables	27,000	40,000	+13,000
Electric generators and motors—			
Total	22,900	16,700	−6,200
To Belgium	530	580	+ 50
„ France	3,200	570	−2,630
„ Spain	1,100	1,200	+ 100
„ India	5,000	3,800	−1,200
„ Argentina	4,400	3,900	− 500
„ Brazil	2,700	2,400	− 300
Static transformers	1,700	870	− 830
Accumulators	2,100	3,150	+1,050
Magnetos	200	130	− 70
Electricity meters	210	110	− 100
Telegraph and telephone apparatus	350	290	− 60
Radio apparatus	400	360	− 40
Insulators, porcelain, &c. ...	490	2,700	+2,210
Lamps—			
Total (thousands) ...	626	1,856	+1,230

* Including radio apparatus, 1,500 q. in 1927, and 3,100 q. in 1928.

† Principal destinations: Argentina, Peru, Spain, Brazil and Cuba in 1927, and Argentina, Russia, Brazil and Peru in 1928.

British Exhibition in Argentina.

A Large-Scale Display at Buenos Aires in 1930.

WE have made mention in previous issues of the projected British Empire Trade Exhibition which is to be held early in 1931 in the vicinity of Buenos Aires. Further particulars have now been received from the London office of the organisers, the British Chamber of Commerce in the Argentine Republic, 5, Parliament Mansions, Orchard Street, Victoria Street, S.W.1.

An appeal is made to British manufacturers and merchants to support the Exhibition to enable it to attain its objects; they are "to place British trade with Argentina more on a par with British purchases and investments there; to demonstrate, not only to Argentina, but also to South America, that British initiative, British goods, and British salesmanship, backed by British credit, so far from declining, are preparing to reach higher levels than ever before." The Argentine Rural Society has placed at the organisers' disposal, free of charge, its splendid grounds and buildings. The Dominion of Canada has already agreed on the space necessary for a large and representative Canadian exhibit, and other Dominions and Colonies are being approached. The British Government is represented on the London executive committee through the Board of Trade Exhibitions Department and will announce its plans at a later date. The Exhibition grounds cover 25 acres and are close to the centre of Buenos Aires, touching its principal recreation ground, Palermo Park. Two principal railway terminals are within a short distance, and it is well served by tramways and omnibus. The grounds are laid out with fully matured lawns, flower beds and roads. In addition to other equipment, they offer eight large buildings, with a total covered area of nearly seven acres. It is proposed to convert the majority of these buildings into the outward semblance of an old English country town. The result will serve the double purpose of giving an English setting to the exhibits, and also of providing a spectacle unfamiliar and attractive to Argentine and other South American visitors. The last exhibition—apart from the Annual Stock Show—held in the Palermo grounds was one of Argentine manufactures in 1926. It was attended by between eight hundred thousand and one million visitors. There is every reason to suppose that the British Empire Trade Exhibition will attract numbers equal to or in excess of that. The British show has a wider appeal; it is a novelty; it has a business interest for every member of the community; and it is being staged with those additional features which attract and impress a Latin community. The organisers are arranging a very thorough information service for exhibitors and every assistance will be afforded them in shipping and arranging their goods and displays.

Association of Public Lighting Engineers.

Annual Conference and Exhibition at Bournemouth.

(*Concluded from page 545*)

Compromise in the Use of Illuminants for Public Lighting.

By C. H. Woodward, A.M.I.E.E.

(*Abstract.*)

Compromise appears in two principal forms: compromise in policy and technical compromise.

The first great compromise which faces us is associated with our attempts to find "daylight's" substitute.

In many places the artificial lighting would be popularly described as "equal to daylight"; but if the two illuminations are compared, the truncated or tunnel effect of the artificial lighting completely destroys any general comparison with daylight; therefore, for this purpose, we are confined to small areas and a limited plane, until such time as the illuminating engineer provides us with an artificial bank of white cloud illuminated from below with floodlights and emitting, say, 0.5 lamberts.

One example of an attempt to improve this condition is found in our 75-ft. mast at the pier approach. This has three lights in triangular spacing at the top, providing a large area of fairly uniform illumination.

If no other sources of light are available, any persons or objects in the vicinity of the post are illuminated horizontally, causing heavy vertical shadows, whilst outside a circle of 150 ft. diameter on the ground, the illumination is equally horizontal and vertical. As the tolerance of the sky is from 0.5 to 2 lamberts, we may take an annulus wherein the vertical and horizontal components of the illumination do not vary more than plus or minus two per cent. This will give us an annulus of illumination on the ground of roughly 71 ft. inner diameter and 79 ft. outer diameter, or a total area of 3,800 sq. ft.

Within this annulus the distribution will be comparable with daylight, and if we consider the useful cone of illumination to be that associated with a spacing to height ratio of 4 to 1, the compromise can be evaluated:—$1-3{,}800/\mu(2\times75)^2=1-.054=.946$, or 94.6 per cent. compromise on distribution.

This method is, plainly, only useful where large open areas have to be illuminated.

For ordinary street lighting we shorten the mast and increase the number, largely sacrificing horizontal illumination and substituting vertical, together with reflected light from buildings, &c. This provides an illumination upon distant objects largely vertical, and comparable with that which occurs from a car headlamp, which, whilst useful for showing up obstacles, distorts and magnifies by excessive silhouette and shadow when travelling over a broken road surface with headlamps exaggerating the contour; this effect is always present in the usual street lighting, and exerts a baleful psychological effect.

Another compromise has to be made with regard to the spectral character of the light emitted; this, however, in the case of the well-adjusted gas mantle or the gas-filled tungsten lamp, is of minor importance as compared with distribution. The useful zone is increased in two ways (*a*) by means of suitable reflectors, and (*b*) by means of refracting glassware; where electric lamps are concerned, the compromise can be greatly reduced by their use.

In the gas lamp we have a notable case where difficulty is experienced in directional control other than that already inherent in the shape of the "bag" mantle. The arrangement of a cluster of mantles in the form of a cone gives an improvement, but I await the advent of a cone formation apex downwards, with concentric reflecting vitreosil chimneys, to prevent the gaseous products from one tier of mantles interfering with those above it. If the "chimney" could be metalised in any manner to increase the specular reflection, a great step forward in the matter of light distribution would be gained. This is a matter well worthy of the attention of the silica manufacturer and manipulator.

The electric lamp lends itself to use in conjunction with reflectors and refractors; as, however, these add to the number of reflecting surfaces interposed in the projected light, each surface usually reflecting the light away from the desired direction, it is not as efficient as it might be, and I look forward to the time when the refracting device for various openings and angles will be incorporated in the bulb of the lamp itself.

It has been usually considered necessary to protect high-wattage gasfilled tungsten lamps with an outer globe, well ventilated; this provides another glass surface to become obscured by dust and to reflect and absorb light uselessly. I have had 50 500-watt gasfilled lamps in use since 1919, exposed, on the sea-front, to rain and wind-driven spray, with no protection whatever; during this period I have not had one failure which I could attribute to this treatment. The compromise which was effected in the installation of these particular lamps was the abolition of an outer protecting globe and the substitution of an oversize bulb to provide more uniform gas circulation in the bulb and to avoid excessively hot spots. This has proved effective.

It has been stated and denied that lighted areas exert a "moth and candle" effect upon fast moving traffic. Some of my audience will perhaps have experienced the "pulling" effect when driving a car and approaching another with bright headlights. My experiment, to show this effect, if any, was to get a friend to drive his car with a single headlamp as fast and as straight as possible while I exposed my camera from the top of the cliff. The result was an "inverse moth and candle" effect, suggesting that the bright areas gave the driver confidence to explore the terrain, and the dark patches forced him to seek the protection of the kerb.

The position of a post on a sharp bend in the road usually calls for a little adjustment in the scheme.

Great uniformity in artificial light distribution is undesirable, and the excessive use of semi-opaque bowl fittings, making use of excessively bright ceilings as a source of illumination for indoor lighting, is to be deplored. In a spacious dining-room well-shaded fittings emphasise the table furnishings, and throw the room surroundings into shadowy relief. The same room, illuminated from the ceiling, gives as much prominence to the wallpaper and the distant corners as to the dining table, making the whole scheme bizarre and vulgar. The same can be accomplished in street lighting, and rather than make a large open space an overlit and glaring area like a sunlit desert, the lighting engineer, by the careful choice of lighting unit and position, can do much to change the space into an Aladdin's Cave without sacrificing efficiency from the traffic point of view, and probably with a definite economy.

The question of decorative compromise is seriously effected in the case of the modern gas lamp. One efficient lantern requires a preheating chamber, an efficient chimney, a large globe, an elastic suspension, a governor, a controller and other gadgets, such as mixture controls and bypasses. How all these ingredients are to be incorporated in a decorative scheme combining pleasing appearance with efficiency is difficult to foresee. A pressure governor, which can be incorporated in the lantern, and which will stand the high temperature whilst being perfectly reliable, is badly needed; and the same may be said of the controller. At the present time we accept them as separate attachments, largely because their unreliability calls for separate detachment.

It is in this matter of decorative compromise where the electric filament lamp has advantages over the gas mantle; it can be enclosed in any shape or size of decorative or directive lantern, and can be "burnt" at nearly any angle. These are the characteristics which largely determine whether it is worth while to pay the extra cost which this illuminant frequently demands.

A compromise which the lighting engineer should carefully watch is one which the gas mantle manufacturer is called upon to exercise. I refer to the ratio of colorant to base. This ratio requires very careful adjustment for each type of mantle, and only those mantles which provide this condition should be used. The question of which is the best mantle can only be decided by the combined use of an experimental burner bar fitted with a pressure governor, meter, burners with good mixture control, so that the zone of "high combustion" may be made to coincide with the "bag" of the mantle, and a photometer to watch the variation in luminosity or to make comparisons. A further useful adjunct is a micro-telescope with dark glass with which to watch for disintegration of the mantle fibre, both generally and specially, for local disintegration due to impurities which act as fluxes and produce holes.

A somewhat similar compromise has to be made by the electric lamp manufacturer; he has to adjust the compromise between luminous efficiency and life of filament, which is arranged upon a rough basis of 1,000 burning hours. It has been proposed that its adjustment shall be subject further to the cost per unit at which the lamp will actually be run.

A lighting unit with a practically concealed emitter, and with a good polar curve, does not appeal to the public as well as a liberal light source with possibly a poor polar curve.

In an ordinary good installation, where the diversity factor is not greater than 20/1, it is an interesting experiment to watch, from a point 60 ft. from the post, a person travelling along the pavement, and to critically note the general character of the image presented to the eye. He will see the person clearly

defined as to colour of clothing and features under the post, but at a distance of 10 yd. beyond this point he will note that the features are uncertain and the clothing cannot be distinguished, while further on it will be noted probably that he is seeing the outline of the person observed against an illuminated background or silhouette. During daylight the object viewed is usually bright, compared with the background, and the average disparity would probably not exceed 20 per cent.—taking averages and ignoring colour contrast—whereas with artificial lighting the disparity reaches closely to 100 per cent. This suggests a natural classification for public lighting: one class which provides an illumination of the "positive" type, in which viewing is secured with a silhouette to bright ratio of not more than, say, 40 per cent., and applicable to congested traffic areas, large open public spaces, business centres and pleasure centres; the other class of the "negative" type, which utilises silhouette together with "glint" chiefly, and which constitutes very largely the bulk of the present-day suburban lighting.

The lighting engineer should not only concentrate upon his lighting unit, but also pay attention to the background, with a view to improving its reflecting factor. It is necessary for the road-making authority to co-operate with him to make the roadway safer for transit by employing materials that will improve the reflection factor of the roadway, which has so notably suffered since the general use of tar and bitumen products.

Discussion on Mr. Woodward's Paper.

Mr. Haydn Harrison, of London, said that appearance did not always mean a great deal of expenditure, but he hoped that engineers would give efficiency their first consideration. As to the problem of glare, there was no more delicate subject. He had noticed that it was much easier to see on concrete roads, which were not black, than on the black tar-paved roads which were being adopted in most countries. He hoped that one day lighting engineers would have a say on the question of road surfaces.

Mr. E. H. Horstman, Bath, made an appeal for ornamental lanterns, on the ground that nature abhorred straight lines, and liked curves.

Mr. E. J. Stewart, of Glasgow, said that there was nothing technical that would prevent their having direct illumination; the great difficulty was to avoid glare.

Replying, Mr. Woodward said the problem of how to avoid glare was the lighting technician's bugbear. They had not got the solution yet, but were approaching the solution of the trouble.

Private Lighting as an Aid to Public Lighting.

By J. S. Dow.

(*Abstract*).

Public lighting is no longer regarded as comprising merely the lighting of streets.

During recent years the public lighting engineer has had to add to his primary duty of attending to the public lamps, the study of the use of light as an aid to the control of traffic. In the future, maybe, local authorities will ordain that every house must bear its appropriate luminous and legible number, and that, for the benefit of the stranger, all essential public buildings shall bear a luminous description of their functions. The supervision of such devices may well be added to his duties. Furthermore, floodlighting and the arts of advertising or giving information by means of light, which at present are used almost exclusively by private persons or firms, may also prove of public service. The public lighting engineer of the future should therefore be an illuminating engineer, but taking within his province every form of lighting that contributes to render a city visible by night.

Theories of street lighting are still based very largely on the original conditions when a few public lamps, at long intervals, furnished the only available light in a street. It was scarcely contemplated that such lamps could *illuminate*, in the sense of rendering objects easily visible. They served rather as isolated beacons, and in the minds of many people that idea still survives. Illuminating engineers are secretly aware that it is an almost impossible problem to furnish adequate illumination from lamps at intervals of 100 ft. or more.

But the conditions are abnormal in other respects. The eye, exposed to the surrounding gloom of soot-darkened and feebly illuminated surfaces of neighbouring buildings, is in a state of dark-adaptation. Its sensitiveness to the isolated bright specks of light seen against this sombre background is enormously increased, and its powers of perception are at a minimum. (It is a fact that, in the case of many eyes, the enlargement of the pupil aperture diminishes acuteness of vision, just as a large stop on a camera lens impairs its definition). Glare is largely a matter of excessive contrast. Early workers laid down the rule that the contrast between the brightest and least bright objects within the field of vision should not exceed 100 · 1—a condition that can be readily complied within the cast of interior lighting, but is almost always violated in street lighting.

Moreover, in any moderately well-lighted interior, objects are seen in their entirety because they are illuminated by diffused light coming from many different directions; but in a street this condition is not realised. Light is furnished only by individual lamps at long intervals. Frequently only the outlines of things are seen, sometimes as an object which is somewhat lighter than its background, but quite as frequently "in silhouette," *i.e.*, a black outline seen against a splash of light on the wet or shiny roadway. It is not surprising that such conditions render the prediction of visibility a difficult and somewhat complicated problem.

Apart from the technical difficulties of street lighting referred to above, there is the psychological difficulty that there is not the same direct appeal to self-interest as is the case of a large shop or factory.

There is, however, another possibility—the provision of special public lighting by private aid. Instances are furnished by the "parade lighting," installed in some streets in London, Sheffield, and other cities, maintained partly by a contribution by local merchants. In the United States this plan has been adopted on a much more extensive scale. Occupants of stores and business premises in important streets have consented to share in the initial cost of the installation, and have responded readily to the argument that better lighting attracts custom. But the introduction of "a blaze of light"—which in practice means "glare"—should be discouraged. Those who contribute to such supplementary lighting may feel that their own wishes should be respected, but the needs of those who use the street must also be studied. Hence this additional lighting should be provided by dignified and pleasing units, and the transition from this brightly-lighted area to the lower adjacent illumination should be *gradual*, so that drivers of motor vehicles would not be dazzled by sudden contrasts.

It would seem that the motorist might well bear part of the cost of public lighting, especially on arterial roads.

The problem of rural highway lighting has been exciting interest in America. Doubt appears to exist whether the authorities possess powers to deal with the problem. Meantime property owners in the vicinity of Detroit, Albany, and Cleveland have paid for lighting installations by private subscription.

Much of the exterior lighting adopted by stores, restaurants, and places of entertainment, in their own interests, forms a useful aid to public lighting. Concealed show-window lighting, for example, helps to enliven a street, and relieves the excessive contrast between public lamps and dark surroundings. The growing practice of keeping such windows lighted after business hours should be encouraged by the granting of special rates for "after-hour" lighting. The installation outside the Galleries Lafayette, Paris, consumes as much as 625 kW per hour—an amount which is roughly equivalent to the total consumption for public lighting in such towns as Epsom, Horsham, and Windsor.

One of the first essentials for successful floodlighting is a light exterior. The grime-encrusted surfaces of buildings present difficulties, and the future development of floodlighting in this country seems to be linked with the question of smoke-abatement.

A third source of supplementary street lighting, from illuminated signs, may also be of value. One can conceive in the future streets lined by luminous light-surfaced buildings, where the intrusion of lamp-posts would seem an absurdity. If the idea of incorporating lighting elements in the frontages of buildings thus became general, a natural step would be for the authorities to require provision to be made for the inclusion of public lighting apparatus when the plans are passed. Streets would then be lighted from units mounted at frequent intervals on the frontages of buildings, and falling naturally into place in the design; the actual street area would be freed from the obstruction of lamp-posts and from the unsightly appearance of cables spanning the roadway.

Owners of buildings can help towards the solution of the lighting problem by keeping the surfaces of buildings moderately clean, so that they serve as diffusers of light. The attachment of brackets to frontages of buildings, which would often render lamp-posts unnecessary in narrow streets, is usually difficult to carry out in this country, unless (as in the City of London) special powers have been obtained. The writer understands that in Cologne the centrally suspended lamps are supported throughout from brackets attached to the buildings, with a spacing ratio of only *three to one*.

Attention has frequently been called to the extraordinary variations in existing rules and regulations governing exterior lighting. In various cities permission has to be sought from quite different authorities (sometimes several in one and the same town), and each has its own code of rules. In some cases these rules are concerned mainly with details of construction and have not been revised for many years; they seem rarely to be framed to give guidance on the point of greatest interest from the standpoint of the illuminating engineer—the degree of brilliancy or constancy of the light. Floodlighting installations are likewise subject to varying restrictions. In some Continental cities it is not unusual to find a number of floodlight projectors mounted on tramway poles for the purpose of floodlighting neighbouring buildings. In this country one of the first difficulties is to find a suitable site for the floodlighting projector.

If it were possible for local authorities throughout the country to be brought into agreement upon broad general principles with regard to exterior lighting, and if such problems could be invariably referred to the same official (eventually, perhaps, the public lighting engineer) for decision, this would help greatly towards the extension of such supplementary lighting.

It is to be hoped that the time is not far distant when every railway station will bear its name in bold and luminous letters. The names of streets in leading cities are poorly revealed; the lettering is sometimes too small and the casual illumination from the street lamps frequently inadequate.

Whereas shops, theatres, and restaurants use light to impress their existence on the public, the names of places of business or professional men are rarely revealed at night by an illuminated sign. Post offices, police stations, libraries, fire stations, and similar public buildings should all be furnished with a distinctive illuminated description. The problem of locating a house in an unfamiliar neighbourhood by the light of a distant street lamp is frequently an exasperating one. Their numbers should be adequately illuminated—a practice already obligatory in Stockholm, Helsingfors, and other cities abroad.

Enterprising local authorities plant trees, and lay out parks and gardens to improve the appearance of the towns by day, and will come, more and more, to make use of artificial light to reveal their towns by night. The floodlighting of the Pavilion with coloured light, on the occasion of the visit of the I.M.E.A. to Bournemouth in 1927, may be recalled as an effective pioneering installation. Similar enterprise was shown in connection with the recent I.M.E.A. Conference at Torquay. Yet another example was the floodlighting of the city buildings in Liverpool during the "civic week" last year.

In Germany, local authorities and lighting interests have joined efforts in organising "festivals of light," during which the cities were brilliantly illuminated. Floodlighting formed a leading feature of these displays. During the progress of the fête in Berlin the demand for this purpose was as much as 20,000 kW.

There are great possibilities in floodlighting with coloured light, such as that which aroused so much interest at the North-East Coast Exhibition this year. These special displays fall short of what might be possible if local authorities and private interests would co-operate in the introduction of civic lighting as a permanent feature—a continuous effort to render their city beautiful by night.

In applying artificial light to a city by night, the designers have certain advantages. The sun sheds its light on boulevards and slums, and good and bad alike are revealed. By night, however, the artist can select what he will reveal. Noble exteriors, or charming vistas by the riverside, may be illuminated. Less happy aspects of cities may remain mercifully hidden.

More might be done to encourage out-of-door life in our parks by night, in the manner familiar in Continental cities, where illuminated cafés and dancing areas afford innocent enjoyment during summer evenings.

The chief point that the author wishes to bring home is that the application of artificial light in a city is a problem that should be considered as a whole. Local authorities, merchants, and entertainers, and undertakings supplying gas and electricity should get together and make plans for the use of artificial light for their common benefit.

Discussion on Mr. J. S. Dow's Paper.

Mr. E. Stroud, of London, took the view that if the streets were efficiently lighted the house numbers could be seen. With regard to glare, possibly the proper way to light a street would be by close spacing and high posts with reflectors high up. But it was a question of expense; therefore refracting appliances were designed to distribute the light over a wider area as a compromise.

Mr. Haydn Harrison, London, put in a plea for illuminated signs at railway stations. He hoped villages would put up their names in the same way, so that people using the roads would know where they were, and that one day powers would be given so that fittings for lights could be fixed on buildings.

Mr. W. J. Jones, of the Electric Lamp Manufacturers' Association, said that Mr. Dow had put his finger right on the source of the street lighting engineers' trouble when he said it was an impossible problem to furnish adequate illumination from lamps at intervals of 100 ft. or more.

Mr. S. E. Britton, of Chester, was glad, as a motorist, to do without street lighting and to rely upon his headlights. It seemed impossible to put up in rural districts a scientific system of lighting. He thought they should do without ornamental standards, and have a simple system, spending as much money as possible on the lighting. As to the cost of energy, they had found at Chester that electricity worked out at something less than a penny a kWh. Some towns were paying 3½d. a kWh for street lighting, which was nothing less than a scandal.

Mr. James Clark, of Aberdeen, thought the ideal set up by Mr. Dow was quite practicable. Private lighting could be co-ordinated and supplemented in a way to benefit the general illumination. Lighting engineers should form some plan for putting this into effect.

In his reply, Mr. Dow urged that municipal authorities might interest themselves in the question of illuminated signs, and not dismiss them as advertising stunts. It was only by keeping an eye on them and controlling them that they could be prevented from becoming an eyesore.

The National Radio Exhibition.

Impressions of the Show and Notes on Some of the Receivers and Component Parts Displayed.

(*Continued from page 545.*)

THE National Radio Exhibition, having had a felicitous prologue by the Prime Minister, speaking *in absentia* from "The Chequers" through the London (2LO) broadcasting station, attracted a multitude of visitors. During the first few days of the show the 300 stands on which some 193 traders displayed their wares attracted an average of 15,000 people per day. Manufacturers realise their share of responsibility in seeing that the public gets the best which science and the industry can provide, and the value offered the purchaser this season was remarkably good. Several component manufacturers displayed for the first time complete receivers of merit; portable and transportable sets were much in evidence, and combination radio-gramophone developments have been notable. Portables this year have shown a tendency to depart from their original function of outdoor sets, and the old "suit-case" style is giving place to an upright type of highly-polished wood that can be moved from room to room and from house to house, and at the same time be more durable and suitable for indoor use. Portables, as well as the heavier sets, are departing from the battery-fed method with its accumulators and recharging inconvenience. The more modern method is to plug the set into the ordinary domestic electricity supply mains and thus eliminate the use of batteries altogether.

The number of licensed listeners constantly increases (2,805,050 on July 1st last) and, despite its critics, there is no gainsaying the fact that the British Broadcasting Corporation has rendered immense service in disseminating knowledge and raising the standard of æsthetic appreciation. Its potentialities are, however, so enormous that one cannot help sharing the Prime Minister's conviction that the wisest possible direction will be needed if they are to be progressively beneficial.

A suggestion of considerable utility was made Sir William Bull, president of the Radio Manufacturers' Association, at the Press luncheon on September 27th at the Royal Palace Hotel, Kensington. In toasting the B.B.C., he pointed out that many non-technical users, probably in the majority, had not the time, inclination, or requisite skill to maintain their receiving installations in adequate operating condition, and he considered it would be of considerable benefit and profit to all concerned if the manufacturers could institute a maintenance and repair service by means of periodical visits of inspection for an annual fee, and so ensure that receiving sets were kept in proper working order.

Mrs. Philip Snowden, of the B.B.C. Board, responded to the toast, other speakers being Mr. J. T. Mould, chairman of the R.M.A.; Mr. A. Beverley Baxter, editor-elect of the *Daily Express;* and Mr. R. B. Weaver, vice-chairman of the R.M.A.

Adey Radio, Ltd.

One of the novelties of the show is the new portable receiver incorporating an unusual circuit patented by Mr. Horace W. Adey, the nature of which has, however, not been divulged yet. The set should arouse interest, as the extremely simple system of controlling the circuit is claimed to be unique in itself. Each set comprises one tuning condenser and a jack key which is inserted into the set when reception is desired; the key in question locks and unlocks the whole system of operation, and when it is removed it is impossible for anyone to operate the set. The main advantage to the public will not only be the simple method of operation, but also the cost of upkeep, in proportion to the efficiency, which has been decreased, as the battery output required is quite small; there is a big reduction in weight,

and the decrease in cost to the purchaser, as compared with present-day portables, is attractive, the quality of reproduction being good. Frame aerial tapping, which has played an important part in portable wireless sets to obtain reaction, is no longer necessary. Having heard the set in operation, we await with interest the explanation of how such results are obtained, as there seems to be little incorporated in the

Fig. 6.—Siemens Combined Volt and Milliamp. Meter.

mechanism of the set. Although the inventor considered the circuit stable and satisfactory, he has kept it on test for months, in the meantime getting patents lodged to insure protection. A rather interesting feature, which is very different from the circuits now being used, is that in the event of the anode circuit battery employed to operate the set being reduced by half, the quality of reproduction suffers but little, and the set continues to be quite stable, showing only a slight reduction in volume. The set is British throughout, and is to be made in a London factory in 1-, 2-, 3-, and 4-valve models. The inventor claims that his one-valve set will actually give better reproduction than a crystal set with a very big reserve of power at the disposal of the user. At the moment the general principle of the invention is only being applied to the manufacture of portable sets.

Philips Lamps, Ltd.

A feature of the display of receivers and accessory devices on this company's stand was the type-4009 valve filament-current transformer (fig. 7), which has been designed to operate off the domestic a.c. mains, models being available for the usual voltages. The output is at 2 and 4 volts, the maximum being 5 amperes.

General Electric Co., Ltd.

This company's extensive stand was attractively set out with a colour scheme and subdued colour lighting effects. The display embraced a very varied selection of "Gecophone" receiving sets and components, as well as a complete range of "Osram" valves. The following is a list of the new receiving sets which were exhibited:—A two-valve receiver designed to work off 200/260-volt, 50/100-cycle a.c. mains; a three-valve screen-grid receiver in portable cabinet form (housing both anode and filament batteries); a three-valve screen-grid set for a.c. mains at 200/260 volts and 50/100 cycles; a three-valve short-wave screen-grid receiver; a four-valve screen-grid portable set; a four-valve screen-grid portable set for a.c. mains at 200/260 volts and 50/100 cycles; and a four-valve screen-grid table cabinet model. The new "Osram Music Magnet" constructor's kit, with its special oak cabinet, was also featured and demonstrations of wiring this recever attracted interest. Among the new components which figured on the stands was a two-valve amplifier for a.c. mains; an anode power unit for a.c. mains (20 mA type), an anode power unit for a.c. mains (40 mA type); and a filament "Hiflux" transformer. Among the loud-speakers shown were the following new "Stork" models:—A cone "Senior" plaque model, a cone cabinet model, together with the new "Stork" speaker unit. The valve exhibit included screen-grid valves, pentodes, valves for a.c. mains for both direct running and with indirectly-heated cathodes, new super-power valves, and standard valves for battery receiving sets. "Osram" valves were used in connection with the broadcast reproducton throughout the period of the Exhibition, and many portable set makers notified on their stands that "Osram" valves were incorporated in their sets. The company's photo-cell was demonstrated in one of the cubicles on the gallery.

Mullard Wireless Service Co., Ltd.

On this company's stand was exhibited a complete range of radio valves, speakers and accessories, including the latest additions to its products in the way of a.c. independently-heated cathode valves and the "P.M." filament transformer. These will be of considerable interest to all those interested in working their radio receivers direct from a.c. mains. The following is a *précis* of the Mullard exhibits:—A complete range of "P.M." valves, including "Pentone" five-electrode power-amplifying valves and screen-grid valves, which have the enormous amplification factor of 200, whilst the amplification factors of the P.M.22, P.M.24, and P.M.26 are 82, 62, and 50, respectively. Of especial interest are the new a.c. valves for direct use on mains; they all have a filament voltage of 4 volts and filament current of 1 ampere, and are made in four types: S .4V, 354 V, 164 V, and 104 V, which, respectively, are screen-grid, super-detector, l.f. amplifier, and power valves. The series of "Pure Music" speakers possesses unusual features in design of diaphragm and magnetic system; they are both of the cone type with a balanced armature, and type "C" incorporates a "tone-filter" operated by means of a switch, being suitable for use on a table or other flat surface, or, alternatively, it can be suspended from a wall. In both cases the connections are reversible without fear of injury to the speaker. The "Permacore" l.f. transformer is of quite new design: small, light, and neat, it is capable of a high performance and has a ratio of 3:1. The core is made of a special alloy having exceptionally high permeability; the primary coil is wound with silver wire and the secondary with nickel. It is claimed to be free from resonance peaks and "blasting."

The "P.M." filament transformer is intended for supplying current from a.c. mains to the heater circuits of a.c. valves of the indirectly-heated type. In design, it ensures absolute safety in operation and in every way complies with the regulations of the Institution of Electrical Engineers. It has a rated output of 5 amperes at 4 volts, having a centre tap for reducing the possibility of "hum" in the receiver. It will operate satisfactorily at any supply frequency between 40 and 100 cycles per second, and is made in six types suitable for use with mains voltages covering a range of from 100 to 260 volts. The anode supply unit is designed to provide the necessary high voltage for valve receivers from alternating-current electric lighting house mains by merely inserting a plug into a lamp holder or wall socket. It provides for four different high voltages, which may be connected as required to the various valves in a receiver, and is supplied with a DU/2 rectifying valve. The "P.M." resistance-capacity coupling unit incorporates two special devices for the prevention of distortion due to the passage of high-frequency oscillation through the l.f. stages.

Siemens Bros. & Co., Ltd.

This exhibit consisted principally of dry batteries, rechargeable Leclanché cells, grid-bias batteries, the GT dry cell being

Fig. 7.—Philips Filament-Mains Transformer.

provided with a flap for fixing it to the set, and special high-capacity batteries for portable sets. A section was also devoted to batteries particularly suitable for use abroad where the climatic conditions are usually adverse to primary cells and batteries. A display of "Crystacel" accumulators of the glass cell type was included, and we understand they are now supplied in the dry charged state with free metal carriers.

Two high-class radio testing instruments were shown: one of them is of novel construction and embodies six ranges, a removable selector plug determining the range in use. Both instruments are of the moving-coil type, of high resistance and robust construction.

The type-650 B combined volt- and milliampere meter (fig. 6) has six ranges (3, 15, and 150 V and 7.5, 75, and 750 A) and is suitable for testing filament and anode batteries and for measuring filament current up to 0.75 A and the plate current of valve receivers. The instrument is of a simple form, with two terminals only for connecting purposes, a removable selector plug determining the range in use. When used as a voltmeter the instrument has a resistance of about 150 ohms per volt.

A very interesting booklet has been produced, entitled "Inside Knowledge," primarily for the benefit of those users of radio sets who are not technical experts, but are interested in obtaining the best results from their wireless apparatus. It is informative and well written.

Fig. 8.—Wates Meter.

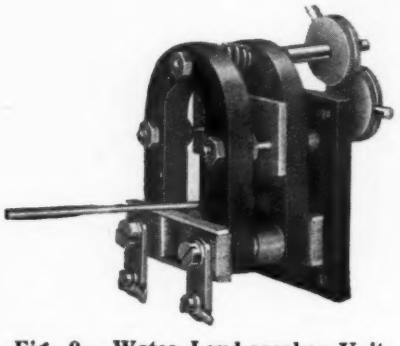


Fig. 9.—Wates Loud-speaker Unit.

Fig. 10.—Cossor Pentode Valve.

A. C. Cossor, Ltd.

The characteristics of the company's latest valve, which incorporates a new process filament, should be noted. The filament has a tungsten core, which makes it even more pliable and robust than the old kalenised filament. In addition to these important mechanical advantages, the improvement is claimed to give an emission 28 per cent. greater than before. In order to prevent trouble either from the electrodes touching, or their microphonic tendencies, Cossor screened-grid and pentode valves (fig. 10) have an interlock construction, a patented feature; fig. 11 shows this in detail, the particular valve shown being the screened-grid one. The diagrams are self-explanatory, and attention is drawn to the "seonite" insulator, which is clearly shown in the first two pictures. The method of bracing the anode will also be found of interest, while the screen will be seen to very effectively shield the anode from the outer (or control) grid.

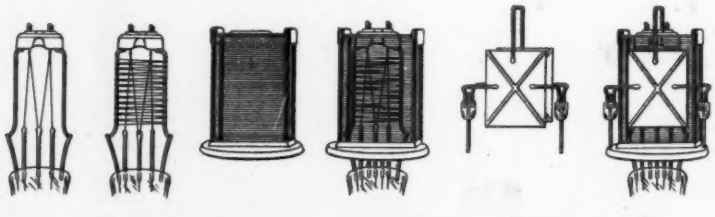


Fig. 11.—Cossor Screen-grid Valve Electrode Construction.

The indirectly-heated mains valves and the new directly-heated mains valve, which has just been introduced by this firm, should be of particular interest. They are intended for use on alternating current fed from a power transformer. Table I gives the characteristics of these valves, and it will not be out of place to mention that when wiring filament circuits for them unusually heavy-gauge wire will be required, as each valve requires 0.8 amp. and the detector requires 2 amps.

TABLE I.—A.C. Valve Characteristics.

Type.	Fil. Volts.	Fil. Amps.	Impedance.	Amp. Fac.	mA/v.	Max. H.T.	
82 M.D. ...	0.8	2.0	23,000	20	0.86	150	
88 M.L.F. ...	0.8	0.8	10,000	12	1.2	150	
88 M.R.C. ...	0.8	0.8	40,000	36	0.9	150	
88 M.H.F....	0.8	0.8	17,000	21	1.23	150	
88 M.S.G. ..	0.8	0.8	200,000	170	0.85	150	s.g. volt 60
88 M.P. ...	0.8	0.8	7,000	8	1.14	150	

The 1930 Cossor "Melody-Maker" is much more efficient, more powerful than its two well-known predecessors, and is of very pleasing appearance, a cabinet (fig. 12) of two-tone blue lacquer with oxidised silver escutcheons being used to house the complete set. One of its features is the new synchronised control, which makes tuning possible with only one knob, while one knob to change wavelengths and one to control volume complete the lay-out; there are no coils to change. There are two models, one for working entirely off a.c. mains and one for battery operation, and in both cases simplicity of assembly is the keynote, there being actually only ten components and twenty wires. Another line is the two-valve a.c. mains set, one model of which will be similarly equipped as the three-valve "1930 Melody-Maker," while the other is housed in a wooden cabinet complete with a loud-speaker.

Fig. 12.—Cossor "Melody Maker."

Standard Wet Battery Co.

We have had a sample of the Wates "three-in-one" panel meter (fig. 8) for mounting on a receiving set, the use of which should help considerably in maintaining consistent operation of the set. It will measure filament voltage (0 to 6 V), anode voltage (0 to 150 V), current (0 to 30 milliamperes), and other values by changing the plugs in the sockets below the instrument, which forms a bridge, the plugs being variously coloured to avoid mistakes. The panel meter and bridge consist of a test volt-ampere meter with three scales on a neatly engraved aluminium dial with red and black figuring, mounted in case with a nickel-plated rim and suitable for fixing in the panel; a 2-inch hole is required, and the meter is clamped in position by means of a special device fixed at the back. A bakelite moulding, also fixed in the panel, is fitted with eight coloured circular disks and three plugs, each having two plug points, for inserting in the disks. The connections are clearly indicated on the ivorine tablet above the bridge.

All this company's testing instruments are operated on the polarised-magnet system, which is entirely different from the moving-iron type, and enables quite an accurate movement to be produced at a price below that of the moving-coil type, although the accuracy is quite sufficiently good for all ordinary radio testing purposes.

On this company's stand products of the Shaftesbury Radio Co. were also displayed, which has developed the Wates "Star" loud-speaker unit having unusual features. Four laminated pole-pieces are provided with four coils; there are two horse-shoe magnets, and double adjustment of the magnets is provided for. The device is illustrated in fig. 9.

Gambrell Radio, Ltd.

In addition to a variety of types of well-made radio receivers, this company produces sets combined with electrically-driven and electrically-reproducing gramophones. The "Novotone" model, while similar in appearance and with respect to controls, includes the following new features:—The "Novotone" attachment compensates in an electrical way for the losses in recording, pick-up, and amplification, and thus improves realism; it incorporates a moving-coil speaker, and is arranged to automatically adjust voltages when the set is switched over to reproduce records. Much has been achieved in the past two years in reproducing sound from gramophone records, though even the advent of the electrical pick-up has gone but a little way in solving the problem of obtaining absolutely realistic reproduction. The primary cause of the trouble is the record itself, for notes below the middle piano scale (under a frequency of 250) are not recorded on the record in anything like their true proportion as originally played,

due to the material limitation imposed by the groove-walls in the record, because for a given volume of sound the lower the note the deeper should be the cut in the groove-walls. The frequency characteristic of the recording system is a horizontal, approximately straight, line from 250 cycles to 5,000 cycles; below 250 cycles it is made to fall away regularly, since, the amplitude varying inversely as the frequencies, there would be danger of one groove encroaching on the next if a loud sound at a low frequency were recorded at its natural strength; above 5,000 cycles and below 50 cycles it cuts off abruptly. In ordinary records it is necessary to restrict the amplitude of notes below about 250 cycles in order that the vibrations may be contained within the pitch of the standard groove. Obviously, at the very beginning of things is a considerable lack of bass notes, and the deeper the note the less, in proportion, is it provided for. Moreover, the average pick-up is generally admitted to give poorer results in the lower and higher registers, as compared with the middle register. Finally, although it is possible to build a theoretically perfect amplifier, it, too, is often deficient in bass notes and sometimes in the higher notes as well. The cumulative effect of these faults is considerable, and must of necessity produce an output of sound from the loud-speaker different from the original music. The "Novotone" compensates for these losses and causes the weak frequencies to appear in their true proportion, giving gramophone music realism. However, it reveals the weaknesses of certain types of loud-speaker, some of which are not quite capable of responding to a fairly powerful bass note. It is, therefore, not advisable to use the "Novotone" with speakers in which the moving armature in its operating position is extremely close to the pole-pieces. Not only is the new device claimed to put in the bass notes at their proper strength (without that "booming" which results when mechanical resonances are used to "fake" up the lower frequencies), but also the higher notes at their proper strength. It also raises the whole sound output to a much higher level, making the general volume of sound some four or more times greater (according to the type of music) than that secured previously. The "Novotone" is connected in between the pick-up and amplifier without the aid of valves or other apparatus. It was originated by Mr. N. W. McLachlan, D.Sc., M.I.E.E., F.Inst.P., and the principle of his tone compensator can be applied equally well to correct the bad quality sometimes heard in the reproduction of talking kinematograph films.

(To be continued.)

Large Water-cooled Transformers.

The 33,000-kVA, 145,000-V transformers recently supplied by the Metropolitan-Vickers Electrica Co., Ltd., to the Brazilian Hydro-Electric Co., Ltd., are of unusual dimensions.

AMONG recent transformer shipments from the Metropolitan-Vickers works is a 33,000-kVA bank of water-cooled high-voltage outdoor transformers for the Parahyba power station of the Brazilian Hydro-Electric Co., Ltd. These transformers, figs. 1 to 3, have a number of interesting features, especially with regard to the provision of water-cooling for such large units and the unusual proportions of the units necessitated by the requirements of transport within the restricted loading gauge of the railway to the site.

The Parahyba power station is located on the Parahyba River about 100 miles north-east of Rio de Janiero. The new transformers are to constitute the third three-phase bank, and will operate in conjunction with a third 33,000-kVA generator. The output of the three generators will be stepped up by the transformer banks and transmitted approximately 95 miles over three high-voltage circuits in parallel to the Cascadura sub-station where the system is linked with lines from the Lages power station.

The "Metrovick" transformers have been designed to operate in parallel with two existing 25,000-kVA banks supplied by the Westinghouse Company. The full winding ratio, with delta-star connection, is 6,600-145,000 volts, and full capacity taps are provided on the high-voltage side for 138,500 and 132,000 volts, an externally operated off-load tap-changing switch being fitted to each transformer

The bank is designed to operate with the high-voltage neutral ungrounded, and the windings were tested at a specified pressure of 304,600 volts for one minute from the high-voltage windings to the low-voltage windings and earth. The high-voltage bushings, which are of the condenser type, were tested at 440 kV dry and 400 kV wet. The transformers were also subjected to a specified test consisting of a dead short-circuit across the secondary terminals with the rated voltage maintained at the primary terminals for two seconds.

The water-cooling coil of seamless copper tubing, arranged in sections, is located inside the upper portion of the tank, and is so mounted that the transformer may be withdrawn from its tank without in any way disturbing the coil. A valve is fitted on the inlet side of each coil to regulate the flow of water, and a sight flow indicator is provided at the outlet of each coil. The flow indicators are of the bucket type and are fitted with electrical alarm contacts, so that warning is given in the event of the water supply falling below a predetermined limit. Both inlet and outlet ends of each section are arranged at the bottom, so that the water may be completely drained out when necessary.

The temperature rise of the transformers at any voltage is not to exceed 55 deg. C. above the temperature of the cooling water when the supply of water is maintained at 36 U.S. gallons per minute. Each transformer unit is fitted

Fig. 1.—Single-phase Transformer, without Tank.

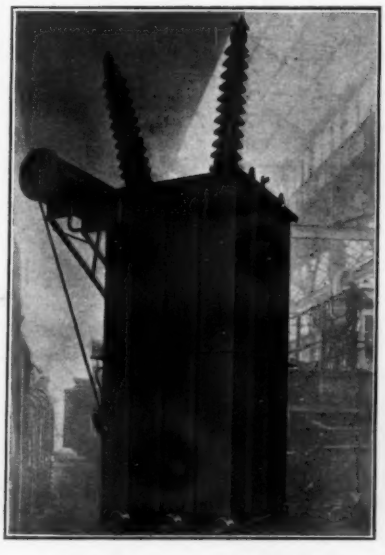


Fig. 2.—Single-phase Unit complete in its Tank.

Fig. 3.—Single-phase Unit, showing Water-cooling Connections.

with two temperature indicators of the type in which the temperature of the hottest part of the winding is reproduced in an element, external to the winding itself, by means of a current which is proportional to the load current. In the case of one indicator of each unit, the heating current, supplied from a current transformer, flows through the metal bulb of a vapour-pressure thermometer. The bulb is mounted in the oil near the top of the tank, and is surrounded by a suitable insulating tube, so that the drop in temperature between the bulb and the oil is the same as that between the main transformer windings and the oil. The temperature of the bulb is shown in a dial indicator, calibrated in degrees Centigrade and mounted on the transformer tank. In the case of the other temperature indicator of each transformer, the heating current passes through a heating coil in which is embedded a copper resistance element, the temperature being measured by the change of resistance of the element; the latter is arranged for connection to the existing station equipment of Wheatstone-bridge-type recorders, which are also calibrated in degrees Centigrade.

Owing to railway clearance restrictions in Brazil, it was necessary to limit the length and breadth of the transformer tanks, each unit being transported to site on its side. The floor space occupied is therefore relatively small, and the transformers are abnormally high; the tank is approximately 8 feet square, and the height from the bottom of the truck to the top of the high-voltage bushing is 24 feet. Each transformer, mounted in its tank, was conveyed from the M.V. Trafford Park works to the Liverpool Docks by road on a 60-ton rubber-tired truck.

The British 132-Kilovolt Grid.

Extracts from a paper read before the International Conference on Large Electric Systems held in Paris in June, 1929.

By J. R. BEARD, M.Sc., M.I.E.E.

THE method employed in settling the transfer capacity to be provided in the various parts of the grid is as follows:—Estimates of the probable maximum demands and load factors for a number of years ahead are first agreed with each of the supply authorities in the area. The generating capacities and operating results of the various selected stations are sorted into a rough order of economy in operating costs, suitable adjustments being made to separate the costs solely dependent on output from those independent of output.

With this as a basis steps can be taken (1) to determine the necessary amount of new plant to meet the anticipated demand in five or six years' time and its most economical location; in the large area covered by one of the schemes ample security can be given by 15 per cent. of spare plant at the winter peak; as the various schemes are linked with each other, the proportion of spare plant may gradually be reduced to about 10 per cent.: (2) to segregate the generating plant into three classes of station intended for normal operation during the winter for three shifts, two shifts, and one shift per day, respectively. This is settled mainly on the basis of running cost, but account is also taken of other factors, such as proximity to the heaviest loads. For the type of load in such an area, with a load factor of rather over 30 per cent., it is found that about 50 per cent. of the plant capacity must be operated on a three-shift basis, about 25 per cent. to 35 per cent. on a two-shift basis, and the remainder on a one-shift basis. Due to plant maintenance during the summer months, the amount of plant maintained on a three-shift and two-shift basis remains approximately constant throughout the year, but many of the one-shift stations can be closed down entirely for six to eight months of the year.

Transfer capacity is provided in duplicate for the following conditions:—

(1) All load fed *from* the grid to an undertaking which has no selected station, and is therefore dependent upon the grid;

(2) All load fed *into* the grid from a selected station at time of peak load (assumed to be the amount by which 90 per cent. of the maximum steaming capacity of the station exceeds the owner's own requirements);

(3) All load fed *into* a selected station from the grid, if the largest machine in the station should chance to be out of commission at the time of peak load, and the remaining machines are running at full output;

(4) All load supplied *from* the grid during the morning peak load to undertakings having a selected station which is only operated in the evening shift.

Duplicate capacity is not provided for the transfer from the grid to a two-shift or one-shift station immediately before it is due to start up or immediately after it is due to shut down. Any interruption to the grid supply under such conditions is assumed to be dealt with by a short extension of the running period of the station affected.

Calculation of expected transfer capacities over a period of years brings out the interesting result that the transfers over the grid do not increase at nearly such a rate as the general increase of load, and that, in consequence, the lay-out and capacity of the grid can be settled to deal with the position ten to fifteen years ahead, without excessive immediate expenditure.

For the main grid 132-kV was found distinctly the most economical voltage for the conditions to be met. Experimental installations of 132-kV cables of the oil-filled type developed by Mr. Emanueli have already been decided upon for two connections from the 132-kV system into the London area. These connections are from Kidbrooke to Deptford (3.3 miles), and from Wimbledon to the station now being constructed at Battersea (5.3 miles). They will each consist of two three-phase circuits of three 0.2 square inch single-core cables laid direct in the ground.

Wayleaves.—The Board is in the same position as any other undertaking as regards the wayleaves for its lines, except it has also the power to obtain compulsory wayleaves over any land by a complicated and lengthy procedure involving a special order which has to be submitted to Parliament.

From the outset the Board has taken the view that it should not use its powers in an arbitrary spirit, but should strive to meet all reasonable public and private opinion. At the same time it is realised that the construction of steel-tower 132-kV lines is essentially different from that of the wood-pole lines hitherto generally employed at lower voltages. From the point of view of cost steel-tower lines must have a reasonably constant span, and height and angles must be avoided where possible. Fortunately the same requirements are also necessary if the general appearance of the line is considered. On representative routes so far constructed or surveyed, it has been found possible to restrict angle towers to 8 per cent. of the towers, and special tower extensions to 9 per cent. of the towers. This has necessitated two, and sometimes three, surveys of nearly half the routes in order to make the best compromise between the interests of the landowners, the Post Office and the Air Ministry, the general effect of the lines on the countryside, and the best engineering routes.

The yearly wayleave rental and compensation standardised by the Board are as follows:—

	132 kV lines	Lower voltage lines.
To the owner of the land	5s. per tower ... 1s. for each crossing not involving a tower	1s. for each leg of each mast or pole 6d. for each stay 1s. for each crossing not involving a mast or pole
To the cultivator of the land ... .. (whether owner or tenant).	15s. for each tower which impedes ploughing ... 5s. for each tower which impedes mowing of grass	1s. for each leg of each mast or pole which impedes ploughing 6d. for each leg of each mast or pole which impedes the mowing of grass

In addition, cultivators are also allowed compensation for any damage to crops due to the erection, inspection and maintenance of the lines.

Line conductors.—The standard conductor consists of a central core of 7 steel wires, each 0.11 in. diameter, surrounded by 30 aluminium wires of the same diameter in two layers. The overall diameter is, therefore, 0.77 in., giving, with the spacings adopted, a critical corona limit of 184 kV under normal atmospheric conditions. The conductor has a resistance equal to that of 0.175 sq. in. of copper. The maximum tension is 8,000 lb. with ½ in. radial thickness of ice at 22°F. and a wind pressure of 8 lb. per square foot on the whole projected area of the ice-covered conductor. This gives a

factor of safety of 2.2. The most economical span with such a conductor is about 1,000 ft., but a standard span of 900 ft. has been adopted. The relatively low tension and short span have been adopted to minimise the risk of vibration troubles, and, with the same object, the point at which the conductor clamps pivot is kept as close to the conductor as possible.

Earth conductor.—The single earth conductor consists of 12 aluminium wires in a single layer. The protection of the steel core is increased by giving it a bituminous coating before the aluminium wires are laid on. The use of a steel-cored aluminium earth conductor is primarily to keep its life equal to that of the line conductors, as the life of a galvanised-steel earth conductor is only some 15 years, and may be much less in the industrial areas. An added advantage of a steel-core aluminium earth conductor is that by its low resistance it diverts a considerable proportion of fault currents from the earth, and, therefore, reduces the inductive effect of faults on parallel communication circuits. Apart from its extra cost (about £30 a mile) its only disadvantage is that it may not be so effective as a plain steel earth conductor in absorbing the energy of surges in the line conductors.

The towers are designed for a minimum ground clearance of the conductor at 122°F. of 22 ft., and for a factor of safety of the towers and foundations of 2.5 under the maximum conductor loadings, and with a wind pressure of 25 lb. per sq. ft. on 1½ times the projected area of one face of the towers. The factor of safety is 1½ under broken conductor conditions. The number of line conductors which it is assumed may be broken is one line or earth conductor for single- and double-circuit straight-line towers, two for single-circuit angle towers, and four for double-circuit angle towers. The minimum normal clearance between live metal and the tower steelwork is 3 ft. 6 in. under the worst conditions of line displacement. Provision has been made for increasing the length of the insulator string up to that corresponding to 11 units at 5-in. centres, without encroaching on the main clearances to cover any specially difficult atmospheric conditions.

Provision has been made for the following variations from normal conditions:—

(*a*) Straight line towers for angles of deviation up to 2°, provided that the sum of the adjacent spans does not exceed 1,600 ft.;

(*b*) The height of all towers can be raised by the addition of extension pieces at the base;

(*c*) Each tower is capable of carrying the vertical weight of 1,500 ft. of conductors (to deal with towers on ground at different levels);

(*d*) All towers may be used at their maximum angle of deviation for spans greater than the normal 900 ft., provided that no span exceeds 1,100 ft. and that the sum of the adjacent spans does not exceed 2,000 ft., with the exception noted in (*a*) above;

(*e*) Angle towers may be used in straight line positions, when the sum of adjacent spans may exceed 2,000 ft., provided no single span exceeds 1,500 ft.

Each section of line between transforming stations is normally given one complete transposition. On the double-circuit lines this is done on a 30° angle tower with special cross arms, and on single-circuit lines in three stages, at each of which one of the standard towers is turned through 180°.

Galvanised mild steel has been standardised after consideration of various non-corrosive steels and of painting as protection in place of galvanising.

	Comparative costs of erected towers.		Total annual expenditure in 20 years for alternative surface treatments.
(1) Galvanised mild steel towers unpainted	100	...	100
(2) Stainless steel towers ungalvanised and unpainted	700 (approx. only)	...	(Too high to be considered)
(3) Pure iron towers ungalvanised but painted ...	130	...	ditto
(4) Galvanised copper-bearing steel towers unpainted	110	...	ditto
(5) Galvanised mild steel towers painted one year after erection with two coats of paint	107	...	220
(6) Mild steel towers ungalvanised below cross arms, this part painted with one coat at works and whole tower painted with two coats on site	101	...	242
(7) Ungalvanised mild steel towers painted with one coat at works and two coats on site	98	...	216

Three types of foundations, *viz.*, excavated earth, concrete ball, and ordinary concrete are used, the type chosen depending on the nature of the subsoil.

The concrete ball foundation is new to Great Britain, but it is widely used in America. It is made by drilling a cylindrical hole for each tower leg and expanding the lower end of the hole to a spherical form by exploding a charge of dynamite. The tower leg stubs are fitted into position by means of a template, and the cavities are filled in with concrete.

Insulators.—Suspension insulators will be used in strings of nine units of the cap-and-pin type at 5 in. centres with ball and socket fittings.

The specified electro-mechanical load is 10,000 lb. The electrical requirements of the insulator chains are defined by relation to their wet flash-over value. Each insulator chain is provided with a guard ring at the conductor end, and with arcing horns at the earthed end. The object of the guard rings and arcing horns is to prevent damage to the line conductors, clamps, and insulators when a flash-over occurs, and also to equalise the voltages taken by each unit of the insulator chains. The relative position of the arcing rings and horns, together with the number of units forming an insulator string, is such as to give a minimum wet flashover voltage of 340 kV. The normal voltage to earth is 76,000, and the factor of safety is therefore 4.5.

The use of arcing rings and horns is by no means standard practice, although the majority of experienced operating engineers seem to be of the opinion that these devices are of very definite value. As American experience has shown that light horns, designed principally with a view to improving the potential distribution on the insulator chains, were inadequate for dealing with power arcs, horns, and rings of very robust construction are being used.

On the initial lines the tension insulators consist of two strings of normal units in parallel, but consideration is being given to the use of single strings of units having an electro-mechanical strength of 20,000 lb.

(To be continued.)

Correspondence.

***Correspondents should forward their communications as early as possible.** No letter can be published unless we have the writer's name and address in our possession.*

Thermal-Storage Water Heaters.

I am much indebted to Mr. Duncan Low for the interest he has taken in the figures I published recently relating to the consumption of off-peak water heaters,* but I am disappointed that he has not supported his criticisms with more comprehensive and more relevant data. For example, Mr. Low's Table III is quite without significance in relation to the Zurich figures. It refers to coal-fired boilers, and it covers a period of five weeks only. It seems to me quite wrong to introduce figures of this nature at all in a criticism of such carefully compiled results as those with which my article was concerned. Thermally, the coal-fired domestic boiler plant is an entirely different apparatus from a properly designed storage heater, and the habits which have been formed by its users in this country are due partly to its poor temperature characteristic and partly to the fact that the hot water is regarded as costing little or nothing to produce.

I should be interested to know the basis of calculation whereby Mr. Low arrives at the water consumption figures he gives in Table I, that is, the heater efficiency and the initial water temperature he has assumed.

With regard to Mr. Low's statement that the Zürich curves of consumption per person per day show a surprising fall as the number of persons in the family increases, I can only say that I do not agree with him. In the first place, these are curves of electrical consumption, not water consumption. One must therefore remember that the daily heat losses from the tank cause the consumption per person in small families to appear high. With larger families this loss is not only divided amongst the members, but also becomes definitely less, since the average temperature of the water during the day is less, consequent upon more frequent use. Furthermore, as Mr. Low suggests, a saving per person is made in the kitchen when the family is large. But this effect was shown in my article to be important, as the kitchen consumption represents between 30 per cent. and 40 per cent. of the total. It seems to me that one should expect a steeply falling curve, tending towards a constant as the family becomes very large, and this is exactly what the Zürich curves show.

Turning to the figures for four Glasgow houses which Mr. Low publishes (Table II), I find similar difficulty in reconciling my ideas with his. Apart from the fact that these results refer to only one heater of each type, which may or may not be important, no details are given of the period over which the results were compiled, the types or location of the storage tanks used, or the length of time or location of the service before the records were taken. Two of the houses are of eight rooms each (the Zürich results were all from smaller houses) and, of the four sizes of heater, only the 20-gallon one compares with the Zürich heaters, but that one was not an off-peak loading! I do not see, therefore, how a compari-

* "Thermal Storage Water Heaters," Elec. Rev., September 13th, 1929.

son of consumption figures can be based on these results. Moreover, I cannot understand the reason for using heaters of the enormous capacities of 90 and 100 gallons in houses of 5 or 6 rooms, if only the ordinary domestic uses are involved.

I agree that storage heaters should not be too small, and, in fact, I said so in my article; but properly lagged tanks of a capacity much in excess of 25 gallons cannot easily be accommodated in the modern middle-class house, and their first cost is high.

Finally, I would say that in my remarks I do not wish to infer that Mr. Low is necessarily wrong if he considers that slightly higher consumptions than those shown by the Swiss curves would apply here. But the facts are that the Swiss figures were the result of a very complete investigation of records from a large number of families, all of the middle class. They are confirmed by a similar thorough investigation made in Germany, in a district remote from Zürich. My own observations tend to confirm them, and at present I do not see, on general grounds, why they should not be approximately correct for this country. Criticism of them is, of course, desirable, so long as the arguments put forward are also supported by complete investigation, and are comparable with the Swiss results in other respects, but it would be a great pity if their value and importance were discounted by anything less than this.

L. G. A. Sims, M.Sc.(Eng.).

Birmingham,
September 28th, 1929

Work for the Unemployed.

I have read with much interest the article by Mr. A. W. Willsmore under the above title, in your issue of September 20th. I am particularly glad to see that he regards increased production as the one and only means of increasing the standard of living in the country. As he puts it, "Without an increase in production, devices such as increasing monetary wages, with a view to improving the living conditions of the workers, are futile."

But how, it may well be asked, is it economically possible to increase production when the existing unemployment indicates an excess of production over demand? Mr. Willsmore replies that some "artificial stimulus to demand" must be found, and he enumerates some possible stimuli, only to damn them with faint praise, and, personally, I feel quite rightly so. To borrow his expression once more, they are "futile." I am somewhat surprised, however, that Mr. Willsmore does not allude to what, in my view, is the only practicable stimulus to demand, i.e., the more general purchase of goods made in this country. I think the omission may be due to Mr. Willsmore's desire not to touch upon a subject which has so unfortunately become "political." The purchaser of a foreign-made article excuses himself upon the comfortable theory that it is immaterial whether an article is imported or made at home, since, in the former case, it will be paid for by some other article made here. It is further argued that the only result of refusing to purchase foreign-made articles would be to transfer labour from the making of goods for export to the making of goods for home consumption, so that no one would be any better off.

This argument overlooks two facts, (1) owing to the low price level of our competitors in foreign countries, we frequently have to export the equivalent of at least one-and-a half articles in exchange for every one which we import, and (2) when there is chronic unemployment in the country, the purchase of home manufactured articles does not result in the transfer of operatives from export to home work, but from idleness to production.

To simplify the problem, let it be assumed that we are importing from abroad all that is required to support our million unemployed. Then, clearly, in order to pay for these imports, we must export the produce of almost another million operatives. If, on the other hand, the unemployed could be put to work, they would become self-supporting and the product of the other million operatives, instead of being set aside to pay for their keep, would go towards raising the standard of living of the country.

However convincing may be the argument for a *laisser-faire* attitude when employment is normal, few will be found to support it in the face of the present unemployment. The only question which really admits of argument, as it seems to me, is what is the best method of encouraging the purchase of home manufactures—— but I have already trespassed too far upon your valuable space.

K. Edgcumbe.

London, *September 27th*, 1929.

Domestic Wireless.

Mr. M. Codd's criticisms would excite more respect if he dealt only in technical facts and avoided ill-concealed antipathies. In his letter on my article, "Laying-on the Domestic Wireless," he cannot avoid this pointless and baseless thrust:—"For commercial expediency we are all shortly to be cursed with a.c. supply, to the detriment of our eyesight and general convenience." Later one finds traces of the same surprising attitude.

Mr. Codd does not like my suggestion that radio sets are bound to depend more and more upon the supply mains rather than upon batteries. Yet both logic and trading facts support me. He says that the bulk of B.B.C. subscribers use gas or oil, but I cannot comprehend or believe any picture of the future made in present-day terms and conditions. The growing dependence upon electric supply is surely undoubted, and it seems to me that in innumerable households the average set of the future will never require anything else than merely switching-on, and, perhaps, simple tuning. This does not mean the complete abandonment of batteries any more than that widespread electric supply will bankrupt all the candle factories.

Mr. Codd is unduly hypercritical of mains-drive apparatus. Properly-designed apparatus does not cause a "loud hum," nor do I think that the ordinary allowable voltage fluctuations matter. True, mains failure is not unknown, but surely it is infrequent; locally, the B.C.C. station has failed more often than the electric supply.

I regret, with Mr. Codd, that eliminators, &c., are relatively so dear; but I trust that these (and the host of conveniences, like vacuum cleaners and hair dryers) will one day attain to a really popular price.

G. E. Moore.

Benton, *September 23rd*, 1929.

My Electric House.

I am pleased to see in your current issue that I have an ally in Mr. W. A. Gillott, with whose remarks, concerning the necessity of members of the electrical profession using electricity more extensively in their homes, I am in entire agreement.

I was very interested in the notes on water-heater consumption contributed recently by Mr. L. G. A. Sims, but I would point out to him that I am fully aware that my converted hot-water system is by no means as efficient, from a consumption point of view alone, as a properly designed electric water-heater with thermostatic control. The main reasons why I adopted this particular method are capital costs and the considerable alterations to existing plumbing work, when installing such a heater, which would be necessary in order to obtain the same service of hot water at all outlets as was enjoyed under the old coal-fired system. I have discussed these considerations more fully in a recent article entitled "Immersion Water-Heaters" (Electrical Review, May 31st, 1929, page 956).

Reg. H. Rawll.

Birmingham, *September 24th*, 1929.

A Problem in Testing.

I wish to bring to your notice a question on testing which was set in a recent examination.

"Two telegraph lines are run between the same two stations and may be designated A B and A_1 B_1.

"A B develops a partial earth fault at C. B and B_1 are connected together and resistance measurements give the following results:—

"Between A and earth (B insulated), 206 ohms; between A and A_1 (B insulated)), 520 ohms; between A and earth (B earthed), 194 ohms; between A_1 and earth (B earthed), 290 ohms. Find the distance A C if A B=25 miles."

At first sight this seems an easy problem, but after having attempted it and getting almost to the solution, I find it becomes rather involved, which causes me to doubt if I have tackled it in the right way.

Perhaps your readers, especially those who are testing experts, may be able to solve it in a very simple way.

A. T. S.

September 29th, 1929.

The Kilowatt Hunting Season Starts.

The E.D.A. Conference on Friday dealt with most of the points required to help this good work forward. But neither the Conference nor the excellent literature issued by the E.D.A. referred to an item of helpfulness which, to a manufacturer, is of supreme importance in regard to selling goods, *i.e.*, the persuasive efforts of representatives whose technical knowledge enables them to be of service to possible customers.

I hesitated to bring this forward at the meeting, as, in the absence of the slightest mention of the point, I thought there must be some reason for its exclusion. As a result, however, of the (sometimes more valuable) informal discussion over the tea-cups afterwards, I now think that the subject may be worth consideration. The following, therefore, are some details of my suggestion for adding another item to the programme of the Outlet Campaign:—

Trained inspectors, men and women, to be employed either by the E.D.A. on a suitable arrangement with the undertakings concerned, or by the undertakings themselves, or by a combination of the various manufacturers interested in apparatus likely to be used.

Daily letters to be sent to a suitable number of consumers in the same street or district, advising that an electrical

apparatus expert will call the next day to answer questions, and to give useful information about their installations, in case they wish to consider using additional apparatus.

Calls upon the local showrooms would be more likely to occur by such introductions, if the matters were not settled at the house.

An additional duty, which would be of value to certain undertakings where the "jerry" wireman had been rampant, might be to inspect and test the wiring and report on it, for the satisfaction or warning of those concerned, and to help to prevent further jerry work.

There is, of course, the question whether the scheme would pay, and that could best be decided by practical experiment. At first, no doubt, the going would be slow; but, as time went on, a greater number of people would be dealt with daily, with greater efficiency also.

Perhaps some of those connected with undertakings dealing with the problem in some such way will state their experience of it for the benefit of the Outlet Campaign.

J. H. C. Brooking.

Croydon,
September 30th, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1928.

6,715. "High-frequency telephone systems." J. J. V. Armstrong (Telefunken Ges. für Drahtlose Telegraphie). March 3rd, 1928. (318,557.)

7,111. "Impregnating paper for insulation of electric cables and apparatus therefor." C. J. Beaver and W. T. Glover & Co., Ltd. March 7th, 1928. (318,647.)

10,102. "Electric switches." J. A. Crabtree. April 4th, 1928. (318,559.)

12,971. "Electric accumulators." C. Croom-Johnson. May 2nd, 1928. (318,502.)

13,671. "Electro-optical cells for use in electrical picture transmission and television systems." L. Mellersh-Jackson (Siemens & Halske Akt. Ges.). May 9th, 1928. (318,654.)

15,423. "Electrically-operated and controlled vehicles." Igranic Electric Co., Ltd., J. Lucas, Ltd. A. H. Mackley, and J. W. Burleigh. May 25th, 1928. (318,475.)

15,688. "Sound reproducers." W. B. Whitmore. August 15th, 1927. (295,625.)

15,887. "Telephone systems." Standard Telephones and Cables, Ltd. (Western Electric Co., Inc.). May 31st, 1928. (318,477.)

15,913. "Electric remote-control systems." British Thomson-Houston Co., Ltd. May 31st, 1927. (291,385.)

15,945. "Quick-acting regulator of the vibrating type for keeping the current or voltage of generators constant." Akt. Ges. Brown, Boveri et Cie. June 1st, 1927. (291,407.)

15,977. "Shock-absorbing mounts for thermionic valves or other electrical devices." Benjamin Electric, Ltd., and G. Campbell. May 31st, 1928. (Cognate applications, 27,190/28 and 19,133/28.) (Addition to 250,431.) (318,507.)

16,076. "Reproduction or amplification of sound waves." H. Green and Celebritone, Ltd. June 1st, 1928. (Cognate application, 4,271/29.) (318,564.)

16,105. "Systems and apparatus for television." J. E. Pollak (Associated Telephone and Telegraph Co.). June 1st, 1928. (318,565.)

16,419. "Signalling arrangements, particularly for use in telephone systems." Standard Telephones and Cables, Ltd. June 6th, 1928. (318,569.)

16,489. "Electrical heating apparatus, particularly for use with incubators." G. T. Church. June 6th, 1928. (318,574.)

16,618. "Electric traction for railways." S. M. Rutnagur. June 7th. 1928. (318,666.)

16,631. "Testing arrangements for electromagnetic relays or the like." Standard Telephones and Cables, Ltd., and S. Chapman. June 8th, 1928. (318,667.)

16,671. "Automatic overload control device." T. S. Ramsdell. June 14th, 1927. (292,126.)

16,676. "Methods of and means for driving films in sound-recording or reproducing apparatus." British Thomson-Houston Co., Ltd. July 5th, 1927. (293,381.)

16,677. "Brush holders for ignition dynamos." British Thomson-Houston Co., Ltd., F. A. Fossey, C. J. Morton, and T. H. Woodfield. June 8th, 1928. (318,669.)

16,703. "Ventilation of dynamo-electric machinery." Sir C. A. Parsons and J. Rosen. June 8th, 1928. (Patent of addition not granted.) (318,671.)

16,706. "Electric-disturbances neutraliser for radio communication." A. H. Marks and P. Russell (legal representatives of E. C. R. Marks, deceased) (H. N. Jasper). June 8th, 1928. (318,672.)

16,715. "Adjustable high-ohmic resistances and the method of manufacturing the same." J. Kremenezky (trading as J. Kremenezky (firm of)). March 31st, 1928. (306,749.)

16,724. "Train-control systems." Associated Telephone and Telegraph Co. August 17th, 1927. (295,679.)

16,986. "Electrically-operated bolts or fastenings." H. Garner and G. H. Mulley. June 12th, 1928. (318,677.)

17,026. "Variable condensers and radio-receiving and the like apparatus incorporating variable condensers." E. J. Wyborn. June 12th, 1928. (318,679.)

17,052. "Arrangements for mounting equipment of the kind used in telephone systems." Automatic Telephone Manufacturing Co., Ltd., F. Kessler, and C. R. Woodland. June 12th, 1928. (318,681.)

17,155. "Buoys or similar signalling stations fitted with acoustical signalling apparatus." J. Pintsch Akt. Ges. June 14th, 1927. (292,128.)

17,283. "Electric signalling apparatus." Igranic Electric Co., Ltd., J. Lyons & Co., Ltd., S. R. Wright, A. Goddard, and G. Douglass. June 14th, 1928. (318,683.)

17,681. "Electric switching systems controlled by timing apparatus." E. Boder. June 23rd, 1927. (292,603.)

17,837. "Holder for incandescent strip electric lights." H. C. Pride. June 20th, 1928. (318,690.)

18,066. "Coupled electric inductance coils." E. H. Chapman. June 22nd. 1928. (318,693.)

19,703. "Electrical heating devices." I. N. Whitesmith, J. A. Dorratt, and Associated Electrical Industries, Ltd. July 6th, 1928. (318,702.)

20,097. "Welding of rails or the like by means of super-heated molten metal." Elektro-Thermit Ges. and A. G. Crum. July 10th, 1928. (318,705.)

20,211. "Telephone sets incorporating manually-operated selectors." Siemens & Halske Akt. Ges. September 22nd, 1927. (297,454.)

20,392. "Electrical sound-producing device." Consulting and Radio Service, Ltd., and N. Turner. July 13th, 1928. (318,708.)

20,894. "Electrical circuit interrupters." Associated Electrical Industries, Ltd. July 27th, 1927. (294,605.)

21,898. "Switchboards." G. T. McGlashan and G. S. Clark. July 28th, 1928. (318,714.)

22,460. "Thermionic valve circuits." H. L. Kirke, B. N. Maclarty, and T. C. Macnamara. August 2nd, 1928. (318,726.)

22,937. "Electrically-heated vessels and the like." T. M. Harrison. February 10th, 1928. (305,643.)

23,224. "Electric heater." H. G. Landis. August 11th, 1928. (318,728.)

24,001. "Cells for the production of gases by electrolytic processes." A. Lane. August 21st, 1928. (318,734.)

24,444. "Lamps, particularly head lamps, for motor vehicles." E. Bienner. September 24th, 1927. (297,672.)

24,739. "High-speed synchronous motor combined with a gear-wheel transmission gearing for driving clocks, and for the control of tariff apparatus of all kinds." Allgemeine Elektricitäts Gesellschaft. September 23rd, 1927. (297,456.)

25,504. "Electric current transformers for use in electric switchgear installations." Siemens-Schuckertwerke Akt. Ges. November 5th, 1927. (300,117.)

28,415. "Sound-reproducing devices." C. French. October 3rd, 1928. (318,766.)

30,239. "Railway and tramway switchboxes or ground levers." S. S. Wrightson and C. R. Matthews. October 19th, 1928. (318,781.)

30,988. "Electric circuits, including smoothing elements." Mullard Radio Valve Co., Ltd., and P. W. S. Valentine. October 25th, 1928. (318,785.)

33,325. "Arrangement for switching off loads on very-high-tension electric nets." Siemens-Schuckertwerke Akt. Ges. November 24th, 1927. (301,078.)

35,331. "Current transformers." Allmanna Svenska Elektriska Aktiebolaget. February 17th, 1928. (306,117.)

1929.

25. "Train-control systems." Associated Telephone and Telegraph Co. August 17th, 1927. (Divided application on 295,679.) (303,415.)

26. "Train-control systems." Associated Telephone and Telegraph Co. August 17th, 1927. (Divided application on 295,679.) (303,416.)

1,151. "Globe fittings for electric lamps." W. McGeoch & Co., Ltd., and C. W. Fraser. January 12th, 1929. (318,817.)

1,200. "Shock-absorbing mounts for thermionic valves or other electrical devices." Benjamin Electric, Ltd., and G. Campbell. May 31st, 1928. (Cognate applications, 35,652/28, 2,185/29, and 2,186/29.) (Divided application on 15,977/28.) (318,575.)

2,066. "Potential supply devices for use with thermionic valves and the like." Telefunken Ges. für Drahtlose Telegraphie. January 20th, 1928. (304,614.)

9,966. "Indirectly-heated thermionic cathode." Dr. S. Loewe. June 25th. 1927. (Divided application on 292,923.) (308,823.)

17,951. "Electric switches." Associated Electrical Industries, Ltd. June 16th, 1928. (313,607.)

Trade Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 25th:—

Premag. No. 505,395. Class 1. Chemical substances used in manufactures, &c.—The Premier Electric Welding Co., Ltd., Harrow Manorway, Abbey Wood, S.E.2.

Davenset. No. 500,350. Class 8. Apparatus for transforming alternating current to direct current.—Hubert G. A. P. Wilson, trading as Partridge, Wilson & Co., 217a, Loughborough Road, Leicester.

Phœbus (lettering and design). No. 503,011. Class 8. Radio gramophones, &c.—Apollo Gramophone Co., Ltd., 4-5, Bunhill Row, E.C.1.

Crolecto (lettering and design). No. 505,151. Class 8. Wireless telephonic apparatus in combination with gramophones.—Geo. Crossley & Son, Ltd., 4, South Street, Manchester.

Vaclam. No. 504,351. Class 13. Vacuum lamps.—The International Vacuum Power Co., Ltd., 34, Victoria Street, S.W.1.

Pedigree. No. 505,482. Class 13. Metal goods for use in electric lighting, heating, signalling and power installations.—J. A. Crabtree & Co., Ltd., Lincoln Road, Walsall.

Vinylite. No. 501,844. Class 50. Synthetic resin in slabs, sheets, bars and tubes for industrial purposes, and moulding materials made from synthetic resin.—The Carbide and Carbon Chemical Corporation, 30, East Forty-Second Street, New York, U.S.A. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Diesel Electric River Tugs.

At Nashville, on the Cumberland River in the United States, railway methods are being employed in modern river transport. Electrically-propelled towboats with a new caterpillar drive are being used to move large trains up and down the river. The small Diesel-electric towboats, which draw only about two or three feet of water, collect the barges from shipping points along the smaller streams, much as a shunting engine would do with railway trucks. The "train," or fleet of barges, is then towed to distant points by larger tugs of similar design. As the barge fleet travels up or down a river, one of the smaller tugs detaches a barge from the fleet and takes it to a dock, perhaps there picking up another barge and attaching it to the fleet, which is done without stopping the barge fleet. The Diesel engines on the smaller boats have a fuel consumption at full load of about three gallons of oil per hour, so that the fuel bill is approximately ninepence an hour only. The caterpillar drive on each side of the tugs consists of a chain with blades attached in a manner resembling the method of attaching buckets on a chain conveyor. Separate motors operate the two caterpillar drives. By reversing the drives, a boat can be turned round in its own length. No rudder is necessary, as the boat is controlled perfectly by the caterpillar drive. Because of their small draught, the smaller towboats can reach docks which have been unavailable to steamboats of deeper draught. Each barge can be loaded through side doors, or through panels in the roof. They are coupled together in long lines, either single file or two or three abreast. A special form of coupler is used which resembles couplers of railway carriages. Although the ends of the barges couple snugly together, the trains are quite flexible, and are capable of making sharp bends because of a movable pontoon at one end of each barge.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

AYR.—Post office extensions, for H.M. Office of Works; architect, 122, George Street, Edinburgh (returnable deposit of £1 1s.).

BEDFORD.—Bank, Cauldwell Street, for Westminster Bank, Ltd.; Searle & Searle.

BEXLEY.—School (350 places), Gipsy Road, Welling, for Kent E.C.; director of education, Maidstone.

BRIDGWATER.—Housing scheme (56), for the T.C.; borough engineer (returnable deposit of £2 2s.).

BRIGHTON.—Houses (72), Bevendean estate; borough engineer. West Street improvement scheme; Lewis and Lewis, Victoria Street, Westminster, advisors for Corporation. Cinema, restaurant, &c., 75-9, East Street; Associated British Cinemas, Ltd. Shops (5), Mafeking Road; Charles Blaker. Rebuilding 179-180, Western Road (£12,223); Geo. Lynn & Sons, builders. Reconstruction, 193-4, Western Road, for Saxone Shoe Co., Ltd. (£10,600); borough engineer.

BRISTOL.—Houses (56), Speedwell estate; Tudball and Gregory. Houses (48), St. Anne's estate; A. W. Norris. Reconstruction, Dings area (£79,000); new roads, &c. (£750,000); private lock-ups, for aerodrome; city engineer.

BURNLEY.—Sewage disposal works (£125,000); borough engineer.

CASTLE-DOUGLAS (Dumfries).—Re-erection of Glenlair (mansion), for Major Wedderburn Maxwell.

CHELMSFORD.—Extensions, offices, London Road; Automobile Association. School, for St. John's district; Education Committee.

CHESTERFIELD.—Girl Guides' divisional headquarters, with lighting and heating work (£3,500); W. A. Derbyshire, architect.

CLEVELEYS (Blackpool).—Church and schools (£10,000); trustees, Congregational Church.

CLUTTON.—Electric lighting installation, Institution, for the Board of Guardians; J. Wayne Morgan, engineer, 9, Mount Stuart Square, Cardiff (returnable deposit of £2 2s.).

COVENTRY.—Extensions, Stoke school (£15,220), for the E.C.; T. Bates & Son, Ltd., builders. Aerodrome, Baginton; Cross Cheaping improvement (£70,000); city engineer.

CROYDON.—Extensions, Coloma Secondary Schools, with assembly hall to hold 700, for the borough E.C.; director of education.

DROITWICH.—Housing scheme (40), for the T.C.; C. T. Butler, borough surveyor.

DUDLEY.—Shops (7) and offices, Union Street; H. L. Builder.

EASEBOURNE (Sussex).—Electric lighting installation Parish Church (£275); vicar.

EASINGTON.—Mining centre; Durham County E.C. and Miners' Welfare Committee.

EDINBURGH.—Filtration, &c., works, Farmilehead, for Waterworks Department (£50,000); city water engineer.

EWELL (Surrey).—Houses (250), for the Allied Building Corporation.

FALKIRK.—School (£60,000); executive officer, Stirlingshire Education Authority.

GRIMSBY.—School, Nunsthorpe (£30,200), for the borough E.C.; R. M. Phillips, builder, Brigg. Extensions, Scartho Hospital, for the Corporation (£26,845); H. Gilbert Whyatt, borough engineer and surveyor.

HARTLEPOOL. — Extensions, Henry Smith School; governors.

HAYES.—Wesleyan hall (£15,000); Somerford & Sons, contractors, Clapham.

HULL.—School, Flinton Grove, for the Hull Education Authority; city architect, Guildhall.

IRISH FREE STATE (Ardee, Co. Louth).—Mental hospital, for the Louth County Council (£65,000).

(Malloy (Co. Cork).—Alterations and improvements at County Home (£9,650), also alterations at the Fermoy District Hospital (£4,650); North County Cork Board of Health and Public Assistance.

(Tullamore).—General hospital; J. F. Mahon, secretary, Board of Health.

KINGSTON-ON-THAMES.—School clinic and offices, for the borough E.C.; borough surveyor (returnable deposit of £2 2s.).

LIVERPOOL.—Council schools, Highfield estate, Broadgreen, and at Whitefield Road; director of education, Education Offices, Sir Thomas Street. Clinics, maternity and child welfare centre, Clifton Street and Norris Green; city medical officer of health.

LONDON (Barking, E.).—School, Upney Farm estate (£46,146), for the E.C.; education architect.

(Hackney, E.).—Factory, 92, Southgate Road; A. J. King, Ltd. Alterations and additions, Kenninghall Cinema, Lower Clapton Road; Kingsland & Sons.

(East Ham, E.).—Secondary school for girls. White House site, for the E.C. Shops (5), Romford Road; H. Johnston. Factory, Barking Road; W. Allison. Remodelling South Hallsville school (£45,000) and senior school, Canning Town (£55,000), for the borough E.C.; education architect.

(Leyton, E.).—Public wash-houses (£14,500), for the T.C.; borough surveyor.

(Hornsey, N.).—Motor service station and lock-ups, Tottenham Lane; Humphries Hollom, Ltd.

(Catford, S.E.).—New premises, 122 to 126, High Street; Bovis, Ltd. Additions, 229 to 303, Hither Green Lane; Kinnear, Moodie & Co.

(Lewisham, S.E.).—Houses (187). Bellingham Farm estate; A. J. Glock, Ltd. School, Downham estate, for the L.C.C.; J. G. Stephenson. School, Riddons Road; J. W. Ellingham, Ltd.

(S.E. and S.W.).—Premises at Tooting, Abbey Wood, Camberwell New Road, Rye Lane, and Rotherhithe, for Royal Arsenal Co-operative Society; S. W. Ackroyd, Commonwealth Buildings, Woolwich.

(Wimbledon, S.W.).—Development, Pollard's Field estate; A. Aitkinson. Alterations, Princes Cinema, Merton Road; W. J. King. Additions, Wimbledon Hospital, Thurstan Road; R. J. and J. S. Thomson. Extensions, 98, High Street; Westminster Bank, Ltd. Additions, High Stevenson's works, Riverside Road; Jas. Burges and Co., Ltd.

(Fulham, S.W.).—Additions, Fulham Picture Palace, North End Road; Brewer, Smith & Brewer, architects, Richmond. Cinema, Fulham Road; Yates, Cook & Darbyshire, architects.

LOWESTOFT.—New premises and extensions, for Co-operative Society; society's architects.

MANCHESTER.—Paramount Theatre, for the Famous Lasky Players, Ltd.; J. Gerrard & Sons, Ltd., builders, Swinton, Lancs. Public swimming baths, Barlow Road, Levenshulme (deposit £1 1s.); city architect, Town Hall.

MANSFIELD.—Extensions, with electric lighting, at Brunt's School; Vallance & Westwick, architects, White Hart Chambers, White Hart Street.

NORTHERN IRELAND (Newry, Co. Down).—Installation of electric lighting at Town Hill and Technical School; electrical engineer and manager, Municipal Electricity Works, King Street (returnable deposit of £2 2s.).

OXFORD.—Houses (42), Green Road; Ives & Rushby. Repair shop, destructor plant, &c., Cowley; Morris Motors, Ltd. Waterworks, Beacon Hill; R. E. Tickel, resident engineer.

ST. HELENS (Lancs.).—Additional housing scheme (300), for the T.C.; borough surveyor.

SOUTHPORT.—Senior school, Birkdale (£21,700); director of education.

SUNDERLAND.—Central school; Education Committee.

TAUNTON.—Market hall, for the T.C.; Stone & Francis, architects, Lloyd's Bank Chambers (returnable deposit of £1 1s.).

WEST STANLEY.—Two schools (£68,000); Durham County E.C.

WHITEHAVEN.—School (400 places), for the borough E.C.; J. S. Stout, architect.